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## LEARNING OBJECTIVES

After reading this chapter, you should be able to do the following:

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| <p>2.1 Understand the basic principles of developmental psychopathology as a way to study the emergence of children's behavior problems.</p> <p>2.2 Explain how genetic, epigenetic, and other biological factors can place youths at risk for mental health problems.</p> | <p>2.3 Describe the way psychological factors (i.e., thoughts, feelings, and actions) can contribute to the emergence of mental disorders in youths.</p> <p>2.4 Analyze the way social-cultural factors can influence children's development both proximally and distally.</p> |
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## 2.1 DEVELOPMENTAL PSYCHOPATHOLOGY

Long ago, six blind men came upon an elephant. Each man touched a different part of the beast to determine what it was. The man who felt a leg said the elephant is like a pillar; the man who felt the tail said the elephant is like a rope; the man who felt the ear said the elephant is like a fan, and so on (Image 2.1).

The men quarreled with each other over the identity of the elephant until the king, who was not blind, approached. The king resolved their dispute by saying, "All of you are right, but only partially. The reason for your disagreement is that each of you is touching a different part of the animal. You must work together to get the complete picture."

Like the men in the story, psychologists try to understand the causes of childhood disorders using a range of approaches. Some psychologists study the biological underpinnings of

behavior; others focus on children's actions, thoughts, or emotions; and others investigate the impact of family, friends, and society on development. Although each approach is helpful, it yields only part of the picture.

For example, if scientists try to understand autism spectrum disorder in terms of genetics or brain abnormalities alone, then they ignore the role that devoted parents and high-quality schools can play in the developmental outcomes of children with that condition. Although biology plays an important role in the emergence of autism, parents and schools also influence the developmental outcomes of youths with this disorder.

Similarly, a researcher who believes that eating disorders are caused by unrealistic portrayals of women and girls in the media may overlook the way operant conditioning can be used to explain dangerous behaviors like bingeing and purging. Although television, movies, and other media can contribute to unhealthy eating behavior in teens, other factors can also affect the emergence and maintenance of this disorder over time. Children's psychological problems are complex and multiply determined. They are best understood when we approach them from multiple perspectives (Cicchetti, 2019).



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IMAGE 2.1. The blind men and the elephant.

## What Is Developmental Psychopathology?

### Development Over Time

**Developmental psychopathology** is a multidisciplinary approach to understanding child development and the emergence of children's mental health problems over time (Beauchaine & Cicchetti, 2020; Rutter & Sroufe, 2000). Developmental psychopathologists try to identify the causes of children's disorders across three broad levels of analysis:

1. *Biological*, including children's genes, brain structure and functioning, and physical health and development;
2. *Psychological*, including children's thoughts, feelings, and actions; and

3. *Social-cultural*, including children's family, friends, schools, neighborhoods, ethnicity, and cultural background.

Developmental psychopathologists integrate data from across these three levels to provide the clearest picture of the causes of children's problems and to find the best way to treat them (Hinshaw & Beauchaine, 2015). They use the term **probabilistic epigenesis** to describe the way factors on each level interact to shape children's development over time (Cicchetti, 2016a, 2016b).

To understand the way each level of analysis influences the others, consider Nina, a child with Down syndrome. As you probably know, Down syndrome is a genetic disorder caused by a mutation of the 21st chromosome (Level 1: Biological). This genetic mutation caused Nina's brain and central nervous system to develop in an atypical fashion. She showed structural irregularities in brain regions important for verbal reasoning, memory, and learning.

These biological abnormalities, in turn, affected her psychological functioning during early childhood (Level 2: Psychological). Nina's parents reported delays in her motor abilities, use of language, and self-care skills. In school, she learned to read, write, and count more slowly than other children.

These psychological characteristics affected the type of care Nina received from parents and teachers (Level 3: Social-Cultural). Nina's mother was understandably very protective, and her teachers offered Nina extra help in school. Nina's cognitive functioning also affected her relationships with peers. Nina preferred to play with younger children rather than her classmates. By the time Nina reached junior high school, she was behind her peers academically. However, Nina was able to spend half the school day in a regular sixth-grade classroom, assisted by an aide. She spent the remainder of the day in a special education class. These extra services offered by her school district enabled Nina to begin a part-time job during high school. Nina's story illustrates the unfolding of development over time. Each level of development affects the one beyond it.

Developmental epigenesis is also a bidirectional process. Genetic and biological factors certainly affect psychological and social-cultural functioning; however, psychological and social-cultural factors can also determine the effects of genes and biology on development. Many experts use the term *transactional* to refer to the way factors across levels affect each other over time (Kerig, 2016; Sameroff, 2000).

To understand the transactional nature of development, consider Anthony, another child with Down syndrome. Anthony's mother, Anita, was heartbroken when her obstetrician told her that Anthony had this condition (Level 1: Biological). Rather than despair, Anita decided that she was going to maximize her son's cognitive, social, and behavioral potential by giving him the most enriching early environment that she could provide. Anita spent countless hours talking to

Anthony, reading books, listening to music, playing games, and going on outings (Level 3: Social-Cultural).

Anita also learned to capitalize on Anthony's strengths. For example, she noticed that Anthony acquired skills best through hands-on learning rather than through verbal instruction. Although Anthony acquired language and daily living skills slowly, Anita had high expectations for him. She remained patient and tried to provide structure and help so that Anthony might learn these skills independently. Anita enrolled Anthony in a special needs preschool and was heavily involved throughout his education (Level 2: Psychological). Anthony developed good language and daily living skills and was able to graduate with his high school class. Today, Anthony is employed full-time in the mailroom of a large company, lives independently, and enjoys bowling and fishing with his friends.

Understanding and predicting child development is difficult for two reasons. First, development is influenced by many factors across multiple levels: genes, biology, psychology, family, and society. Second, these factors are constantly changing over time, each interacting with the others. Consequently, no single factor determines children's outcomes. Instead, the unfolding of development is probabilistic; a person's developmental outcome can vary depending on the interplay of many biological, psychological, and social-cultural factors. Developmental psychopathologists use the term *probabilistic* to refer to the complex transaction of factors that shape development over time (Gottlieb & Willoughby, 2006; Rutter & Sroufe, 2000).

### Adaptive vs. Maladaptive Behavior

From the perspective of developmental psychopathology, normal and abnormal behavior is determined by the degree to which it promotes children's competence. **Adaptive behavior** allows children to develop social, emotional, and behavioral competence over time and meet the changing demands of their environment. Examples of adaptive behavior include toddlers learning to understand other people's emotional states, school-age children learning to think before acting, and adolescents using moral reasoning to solve interpersonal problems. These behaviors are adaptive because they allow children to understand and interact with their environment in an effective and flexible way (Cicchetti, 2019).

**Maladaptive behavior** interferes with children's social, emotional, and behavioral competence or does not meet the changing demands of the environment. Examples of maladaptive behaviors include toddlers who do not understand others' emotional expressions or withdraw from social interactions, school-age children who impulsively hit others when they are angry, and adolescents who mistreat peers. These behaviors are considered maladaptive because they indicate a failure to develop competencies and they interfere with children's social-emotional well-being (Cicchetti, 2019).

Adaptive behavior is determined by the child's *developmental context*. Normality and abnormality are dependent on





**IMAGE 2.2.** Behavior must be understood in the context of children's age and level of development. Although tantrums are developmentally expected in toddlers, they can be signs of maladaptation when shown by older children.

children's age and level of development (Image 2.2). Consider a 2-year-old boy who refuses to dress in the morning and tantrums when told that he cannot have cookies for breakfast. Although these oppositional behaviors cause parents grief, they are usually not considered abnormal in 2-year-olds. In fact, stubbornness can reflect toddlers' developmentally appropriate bids for autonomy. However, the same behaviors shown by a 6-year-old child would likely be considered maladaptive and abnormal. In the context of his age and level of development, these behaviors likely reflect problems balancing needs for autonomy with respect for parental authority (Burt, Coatsworth, & Masten, 2016).

Adaptive behavior is also determined by the child's *environmental context*. Consider Xavier, a 13-year-old boy who has a history of running away from home, staying out all night, skipping school, and earning low grades. Clearly, Xavier's behavior is problematic. However, if we discover that Xavier is also experiencing physical abuse at home, we might see how his problematic behavior reflects an attempt to cope with this psychosocial stressor. Specifically, Xavier runs away and stays out all night to escape physical maltreatment. Furthermore, he likely has difficulty completing assignments and attending school because of his stressful home environment. Xavier's actions are best understood in terms of his environmental context.

Developmental psychopathologists view abnormal development as a deviation from normality. Our ability to recognize, understand, and treat childhood disorders depends on our knowledge of normal child development. Consider George, a 16-year-old boy who begins drinking with friends at parties. Approximately once every month for the past 6 months, George has consumed several alcoholic beverages while partying with friends. He drinks in order to have fun and has never gotten into trouble or put himself in dangerous situations while intoxicated. Consider also Maria, a 14-year-old girl who is dieting to lose weight. Although Maria's weight is average for a girl her age and height, she is very dissatisfied with her body and feels like she needs to lose at least

15 pounds. Whether we regard George and Maria's actions as abnormal depends partially on whether their behaviors are atypical of adolescents their age or inconsistent with the environmental demands they face. We need to know something about normal development in adolescents their age to determine if their behavior is atypical and potentially problematic (Masten & Kalstabakken, 2019).

Developmental psychopathologists also believe that abnormal behavior can shed light on normal child and adolescent development. Youths who clearly show delays in mastering developmental tasks or failures in meeting environmental demands can teach us how development typically proceeds. For example, children with autism show unusual deficits in perceiving and interpreting other people's social behavior. By studying these deficits, researchers are beginning to understand how the ability to process social information develops in infants and children without this condition (Toth & Manly, 2020).

### Review

- Development is shaped by multiple factors across three broad levels of analysis: biological, psychological, and social-cultural. Development is probabilistic rather than predetermined. Development is also transactional; each factor influences the others over time.
- Developmental psychopathologists view behaviors as either adaptive or maladaptive. Adaptive thoughts, feelings, and actions promote children's competence.
- Adaptive and maladaptive behaviors can only be understood in the context of the child's development and environment. A behavior that was adaptive in one situation or in the past might be maladaptive in another situation or at a different time.





## What Affects the Course of Development?

### Developmental Pathways

As children grow, they face certain **developmental tasks** or challenges that depend largely on their age and developmental level. Erik Erikson (1963) outlined some of the most important social and emotional tasks facing individuals as they progress from infancy through old age. For example, the primary developmental task facing infants is to establish a sense of trust in a loving and responsive caregiver. Infants must expect their caregivers to be sensitive and responsive to their physical, social, and emotional needs and to see themselves as worthy of receiving this care and attention from others. A primary developmental task of adolescence is to establish a sense of identity. Adolescents must develop a coherent sense of self that links childhood experiences with their goals for adulthood. People usually accomplish this task by trying out different social roles during their teenage years (Table 2.1).

Developmental psychopathologists use the term **developmental pathway** to describe the course or trajectory of children's development (Masten & Kalstabakken, 2019).

**TABLE 2.1 ■ Common Developmental Tasks Across Childhood and Adolescence**

Stage	Developmental Tasks
 Infants and toddlers	<ul style="list-style-type: none"> <li>• Attachment to caregivers</li> <li>• Basic motor skills: sitting, standing, walking, jumping</li> <li>• Acquiring basic speech and language skills</li> <li>• Achieving a sense of autonomy from parents</li> </ul>
 Younger children	<ul style="list-style-type: none"> <li>• Taking care of self and helping out at home</li> <li>• Obeying the rules at home, school, and in public</li> <li>• Learning basic academic skills: reading, spelling, writing, arithmetic</li> <li>• Making and keeping friends</li> </ul>
 Older children	<ul style="list-style-type: none"> <li>• Greater independence outside the home (e.g., after-school activities, sports)</li> <li>• Mastering more advanced academic skills: creative writing, science, advanced math</li> <li>• Developing a personal identity or sense of self</li> <li>• Fostering close relationships with peers</li> </ul>
 Teens	<ul style="list-style-type: none"> <li>• Greater involvement in clubs, volunteer work, or a part-time job</li> <li>• Preparing for full-time employment, job training, or college</li> <li>• Obeying the laws of society (e.g., curfew, driving a car, substance use)</li> <li>• Building close friendships and possible romantic relationships</li> </ul>

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Developmental tasks present forks in this pathway. The child can either successfully master the developmental task or have problems with its successful resolution. Mastery of developmental tasks leads to competence, placing children on course for optimal development. However, failure to master early developmental tasks can interfere with the development of later skills and abilities.

For example, infants who establish a sense of basic trust in caregivers may have greater ability to make and keep friends in

later childhood. However, failure to establish a sense of trust in caregivers during infancy may interfere with children's abilities to develop close peer relationships later in childhood (Handley, Russotti, Rogosch, & Cicchetti, 2020). Similarly, young children who learn to regulate their behavior and emotions may be able to pay attention in school and cope with minor setbacks and disputes with their classmates. However, young children who continue to tantrum or act aggressively when they do not get their way may be ostracized by their peers (Beauchaine & Cicchetti, 2020). Consider Carter, a boy heading down a problematic developmental pathway.

We can also think of development as analogous to a building. Our genetic endowment might form the foundation of the building, providing us with our physical attributes, raw neurobiological potentials, and behavioral predispositions. The ground floor might consist of early environmental experiences, such as our prenatal surroundings or the conditions of our gestation and delivery. Subsequent floors might consist of postnatal experiences, such as our nutrition and health care, the relationships we develop with our parents and other caregivers, the quality of our education, and the friends we make in school. The integrity of the upper levels of our "building" is partially determined by the strength of the lower levels. For example, problems with the foundation will place additional challenges on the formation of higher levels. However, especially well-developed higher levels can partially compensate for difficulties in the foundation.

The building does not exist in a vacuum, however. The context in which the structure is created is also important. Just as temperature, wind, and rain can affect the construction of a building, so, too, can the child's social-cultural climate affect his development. Social and cultural conditions can promote the child's psychological integrity: high-quality schools, safe neighborhoods, and communities that protect and value children and families. Other social and cultural factors, such as exposure to poverty and crime, can compromise child development.

### Continuity vs. Change

Developmental psychopathologists are also interested in predicting the course of development. Some psychological problems tend to be developmentally transient; they rarely persist into adolescence or adulthood. For example, elimination disorders (e.g., bed-wetting and soiling) tend to exist only during early childhood.

Other disorders show **homotypic continuity**—that is, they persist from childhood to adolescence or adulthood relatively unchanged. For example, young children with intellectual disabilities or autism will likely continue to experience these conditions as adults. Although the severity of these problems may decrease over time, these children will likely continue to experience problems with cognitive or social functioning, respectively (Maughan & Rutter, 2010).

Most childhood disorders, however, show **heterotypic continuity**—that is, children's symptoms change over time, but their underlying pattern of behavior remains the same.

## CASE STUDY

### DEVELOPMENTAL PATHWAYS

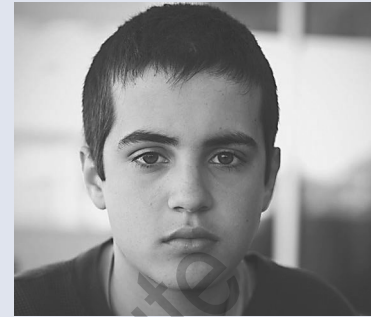
#### A Pathway to Trouble

Carter was a 13-year-old boy who was referred to the psychologist at his school because of fighting. Although Carter's most immediate problem was getting into fights with other boys at lunch and after school, the psychologist knew that Carter's problems began much earlier. As a preschooler, Carter was physically abused by his mother's live-in boyfriend. Like many children who experience maltreatment, Carter developed problems trusting adults—especially men. He was reluctant to develop close emotional ties with others or to rely on others when he was sad, scared, or in need of comfort and reassurance. Instead, Carter became mistrustful of others and often expected others to be angry or hurtful toward him. These early experiences placed him on a developmental path strewn with many obstacles toward a healthy view of himself and others.

Carter's early experience of maltreatment also taught him that physical aggression can be an effective, short-term strategy for expressing anger and solving interpersonal problems. Instead of learning to avoid arguments or to regulate his emotions, Carter tended to solve disputes by yelling, pushing, or punching. These aggressive actions interfered with his ability to develop more adaptive, prosocial problem-solving strategies and led him further along a path to long-term problems.

Now in middle school, Carter has few friends and is actively disliked by most of his peers. Because of his social rejection, Carter spends time with other peer-rejected youths who introduce him to more serious, disruptive behavior: truancy, vandalism, and alcohol use. Carter is following a path blazed by many youths who show conduct problems and antisocial behavior in adolescence.

Luckily, it is not too late for Carter. His school psychologist might help him find ways to reconnect with prosocial peers. Maybe Carter can join a sports team or after-school club? The psychologist might also be able to teach Carter new strategies to regulate his emotions and solve social problems so that he does not have to rely on fighting. Most importantly, perhaps the psychologist's actions and empathy can convince Carter to trust other adults. Interventions like these can help Carter find a new path to adulthood that is characterized by behavioral, social, and emotional competence.



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To understand heterotypic continuity, consider Ben, a 6-year-old boy diagnosed with ADHD. Like most young boys with ADHD, Ben's most salient problem is hyperactivity; he frequently leaves his seat during class, talks with his neighbors, and fidgets with his clothes and belongings. By middle school, however, Ben shows more problems with inattention than hyperactivity. He has difficulty staying focused during class, remembering to complete his homework, and ignoring distractions during exams. As a young adult, Ben continues to experience underlying symptoms of ADHD, but he is most bothered by problems with organization, planning, and prioritizing activities at home and at work. Although Ben's most immediate symptoms have changed, his underlying problems with attention and inhibition have persisted over time (Barkley, 2016).

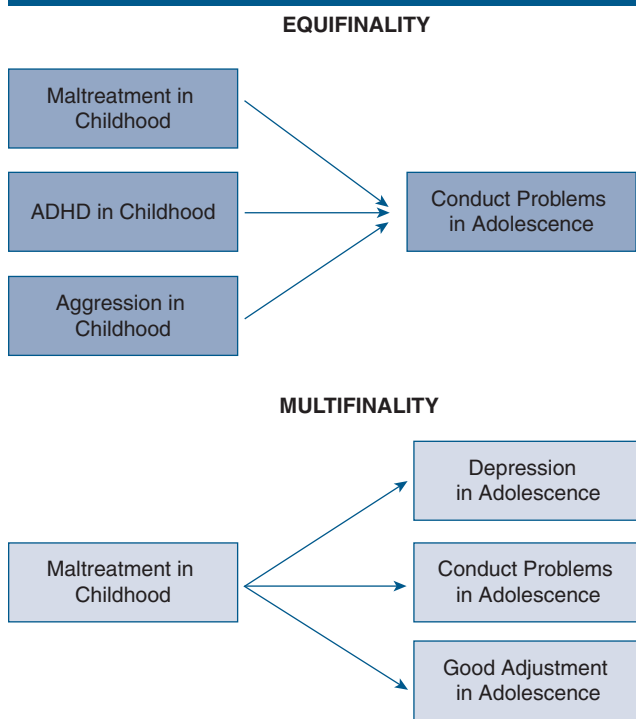
Another example of heterotypic continuity can be seen in Emma, an extremely shy preschooler. Approximately 15% of infants inherit a temperament that predisposes them to become shy and inhibited when placed in unfamiliar situations (Fox, Snidman, Haas, Degnan, & Kagan, 2015). Emma, who inherited this tendency, developed extreme anxiety when separated from her mother. She would cry, tantrum, and become physically ill when her mother would leave her at preschool. Although Emma's separation anxiety gradually

declined, she began experiencing problems with chronic worrying in middle school. Now, as a young adult, Emma continues to experience problems with both anxiety and depression. Although Emma's symptoms have changed over time, her pattern of underlying emotional distress has persisted into adulthood.

#### Equifinality and Multifinality

Of course, not all childhood disorders persist into adulthood. Why do some conditions show continuity, whereas others do not? Developmental psychopathologists are very interested in individual differences in these divergent developmental outcomes. Predicting individual differences in development is extremely difficult because, as we have seen, many factors interact over time to affect children's outcomes. The interactions between factors, over time, produce two phenomena: equifinality and multifinality (Hinshaw & Beauchaine, 2015).

**Equifinality** occurs when children with different developmental histories show similar developmental outcomes (Figure 2.1). Imagine that you are a psychologist who conducts evaluations for a juvenile court. As part of your duties, you assess adolescent boys who have been arrested and convicted of illegal activities in order to make recommendations to the

**FIGURE 2.1 ■ Equifinality and Multifinality**

*Note:* Equifinality occurs when children with different histories show the same outcome; multifinality occurs when children with the same history show different outcomes.

court regarding treatment. All of the boys that you assess have similar developmental outcomes—that is, they all show conduct problems. However, after you interview many of the boys, you discover that their developmental histories are quite different. Some boys were physically abused in early childhood. Other boys had problems with ADHD and risk-taking behavior. Still other boys had long histories of aggressive and destructive behavior. Your discovery illustrates the principle of equifinality in child development: There are many different paths to the same developmental outcome.

The principle of **multifinality** refers to the tendency of children with similar early experiences to show different outcomes. Imagine that you are a clinical social worker who evaluates children who have been physically abused. During the course of your career, you have assessed a number of children who have been abused by their caregivers. You notice that some of these children show long-term emotional and behavioral problems, whereas others seem to show few long-term effects. Your observation reflects the principle of multifinality: Children with similar early experiences can show different developmental outcomes.

The principle of equifinality makes it hard to determine the cause of a child's disorder. Because of equifinality, we usually cannot infer the causes of children's problems based on their current symptoms. For example, many people incorrectly believe that all adolescents who sexually abuse younger children were, themselves, sexually abused in the past.

In actuality, adolescents engage in sexual abuse for many reasons, not only because they were victimized themselves (Fox & DeLisi, 2019).

The principle of multifinality limits our ability to predict a child's developmental outcome. For example, many people erroneously believe that if a child has been sexually abused, she is likely to exhibit a host of emotional and behavioral problems later in life, ranging from sexual dysfunctions and aggression to depression and anxiety. In fact, the developmental outcomes of boys and girls who have been sexually abused vary considerably. Some children show significant maladjustment while others show few long-term effects. Their diversity of outcomes illustrates the difficulty in making predictions regarding development (Hinshaw & Beauchaine, 2015).

### Review

- Developmental pathways reflect the manner in which children face developmental tasks over time. Competence in early developmental tasks (e.g., trust in infancy) can promote competence in later tasks (e.g., friendships in adolescence).
- Some disorders, like autism, show homotypic continuity; they remain relatively stable over time. Most disorders, such as anxiety and mood disorders, show heterotypic continuity; the overt signs and symptoms of the disorder change over time, but the underlying problem remains relatively constant.
- Equifinality occurs when children with different histories show the same outcome. Multifinality occurs when children with the same history show different outcomes.

## Why Do Some Children Have Better Outcomes Than Others?

### Risk and Protective Factors

What explains equifinality and multifinality? Why is there such great variability in children's developmental pathways? The answer is that child development is multiply determined by the complex interplay of biological, psychological, and social-cultural factors. Some of these factors promote healthy, adaptive development, whereas others increase the likelihood that children will follow less-than-optimal, more maladaptive, developmental paths.

Developmental psychopathologists use the term **risk factors** to describe influences on development that interfere with the acquisition of children's competencies or compromise children's ability to adapt to their environments. Risk factors can be biological, psychological, or social-cultural (Cicchetti, 2016a).

In general, the more risk factors experienced by children, the greater their likelihood of developing a disorder. In one study, researchers counted the number of environmental risks experienced by a large sample of adolescents (McLaughlin et al., 2012). Approximately 58% of adolescents experienced



at least one risk factor such as parental divorce, parental substance use problems, or economic hardship. Regardless of race, ethnicity, or gender, the more risks that children experienced, the greater their likelihood of developing a mental health problem. Certain risk factors were especially predictive of disorders, such as parental criminal involvement, parental mental health problems, family violence, and child maltreatment.

It is noteworthy, however, that not all youths who experience these risk factors develop mental disorders. **Protective factors** refer to biological, psychological, and social-cultural influences that buffer the negative effects of risks on children's development and promote adaptation. For example, parental divorce is a risk factor for behavioral and emotional disorders in young children, especially in families experiencing chronic stress and economic adversity (Hetherington, 2014). However, certain factors protect children of divorced parents from developing problems. These protective factors include the child's temperament or innate emotional disposition (a biological factor), the quality of the parent-child relationship (a psychological factor), and the degree to which parents can rely on others for support (a social-cultural factor).

The salience of a risk factor depends on the child's age, gender, level of development, and environmental context. For example, child sexual abuse is a risk factor for later psychosocial problems. However, the effects of sexual abuse depend on the gender of the child and the age at which the abuse occurs. Boys often show the greatest adverse effects of sexual victimization when they are abused in early childhood, whereas girls often show the poorest developmental

outcomes when abuse occurs during early adolescence. Similarly, the ability of protective factors to buffer children from the harmful effects of risk depends on context. For example, many children who experience sexual abuse report considerable distress and impairment. However, children who are able to rely on a caring, nonoffending parent are often able to cope with this stressor more effectively than youths without the presence of a supportive caregiver (Cohen, Deblinger, & Mannarino, 2019).

## Resilience

Protective factors are believed to promote resilience in at-risk youths. **Resilience** refers to the tendency of some children to develop competence despite the presence of multiple risk factors (Hayden & Mash, 2014). Consider Ramon and Rafael, two brothers growing up in the same low-income, high-crime neighborhood but experiencing different outcomes.

What accounts for Ramon's struggles and Rafael's resilience? Although there is no easy answer, a partial explanation might be the presence of protective factors at just the right time in Rafael's development. Ramon's path to anti-social behavior was probably facilitated by peers who introduced him to criminal activities. In contrast, Rafael's peer group encouraged prosocial activities and the development of artistic competence. If Rafael's teacher did not encourage the development of his talents until later in Rafael's development, perhaps after he developed friendships with deviant peers, would he have followed the same developmental pathway as

## CASE STUDY

### RISK AND RESILIENCE

#### Divergent Developmental Paths

Ramon and Rafael are brothers growing up in the same impoverished neighborhood. Ramon, the older brother, begins showing disruptive behavior at a young age. He is disrespectful to his mother, defiant toward his teachers, and disinterested in school. By late elementary school, he has been suspended a number of times for fighting and being truant. In junior high school, Ramon associates with peers who introduce him to other antisocial behaviors, such as shoplifting and breaking into cars. By adolescence, Ramon rarely attends school and earns money selling drugs. At 15, Ramon is removed from his mother's custody because of his antisocial behavior and truancy.

Rafael, the younger brother, also shows early problems with defiance and aggression. However, these problems do not persist beyond the early elementary school years. Although Rafael does not enjoy school, he befriends an art teacher who recognizes his talent for drawing. The teacher offers to tutor him in art and help him show his work. Rafael



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also takes art classes at a local community center to learn new mediums. Through these classes, he meets other adolescents interested in drawing and painting. Rafael's grades in high school are generally low; however, he excels in art, music, and draftsmanship. He graduates with his class and studies interior design at community college.



Ramon? Although we do not know for sure, we can speculate that these protective factors played an important role in his ability to achieve despite multiple risks (Masten & Cicchetti, 2016).

Most protective factors occur spontaneously: A teacher nurtures a special talent in an at-risk youth, a coach encourages a boy with depression to join a team, or a girl who has been abused is adopted by loving parents. Sometimes, however, protective factors are planned to prevent the emergence of disorders. For example, communities may offer free infant and toddler screenings to identify and help children with developmental disabilities at an early age. Similarly, schools may offer prevention programs for students at risk for learning disabilities. Even psychotherapy can be seen as a protective factor. Therapy helps children and adolescents alter developmental trajectories and promote long-term well-being (Masten & Kalstabakken, 2019).

### Review

- Risk factors interfere with the acquisition of children's competence or their ability to adapt to their surroundings. Protective factors buffer children from risks.
- Resilience occurs when children develop competence despite the presence of multiple risk factors.

## 2.2 BIOLOGICAL INFLUENCES ON DEVELOPMENT

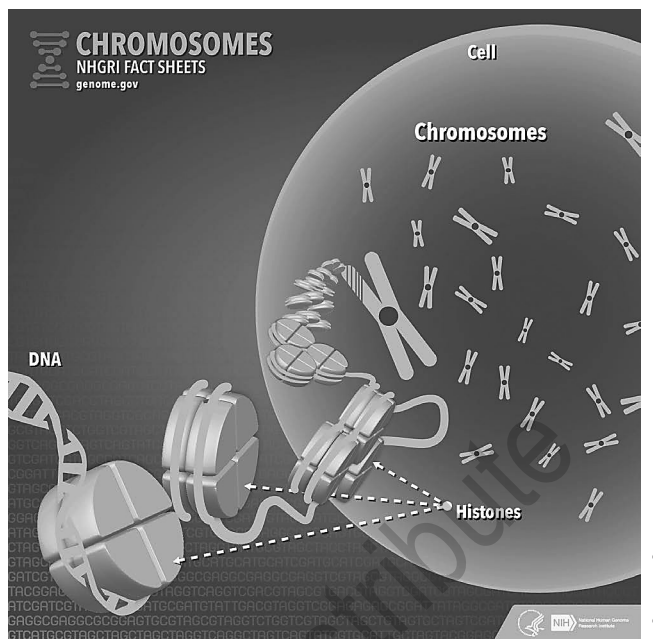
### How Can Genes Affect Development?

#### Genes and Chromosomes

Our body contains approximately 50 trillion cells, each containing our complete genetic code. The code is written using deoxyribonucleic acid (DNA). DNA is shaped like a twisted ladder, or double helix. The "ropes" of the ladder are made up of sugars (deoxyribose) and phosphates. The "rungs" of the ladder consist of pairs of chemical bases held together by hydrogen bonds. Their structures allow them to combine only in certain ways, forming our unique genetic blueprint. DNA instructs each cell to build proteins, which form the structure and characteristics of the person (Frommlet, Bogdan, & Ramsey, 2016).

Segments of DNA are organized into **genes**. A single human cell contains approximately 20,000 genes. If the genes in each cell were connected together, end to end, they would be approximately 2 meters long. To save space in the cell, genes wrap around special proteins called **histones**. **Histones** are important because they can turn genes "on" and "off" by binding to them in certain ways (Rutter & Thapar, 2015).

Genes are organized into strands called **chromosomes**. In typically developing humans, each cell contains 23 pairs of chromosomes, for a total of 46. Twenty-two of these pairs,



**IMAGE 2.3.** Each cell contains 23 pairs of chromosomes. Each chromosome contains genes, which consist of DNA and proteins (called histones) around which DNA is wrapped.

called autosomes, look the same in both males and females. The 23rd pair, the sex chromosomes, differs in males and females. Females have two X chromosomes, whereas males have one X and one Y chromosome (Image 2.3).

Most cells form in a process called mitosis. In this process, chromosome pairs split in two and duplicate themselves. Then, the cell divides, forming two cells with 23 pairs of chromosomes each. The resulting (daughter) cells are identical to the original (parent) cell. Each cell contains the entire genetic code, but certain segments of the code are switched on or off, telling the cell its function: to serve as lung tissue, heart tissue, or other parts of the body.

Sex cells (i.e., sperm and ova) form differently, in a process called meiosis. Just as in mitosis, chromosome pairs split and duplicate themselves. Unlike in mitosis, however, chromosome pairs line up and exchange genetic material with each other, a process called recombination. Finally, the recombined chromosomes split into two daughter cells that are genetically different from the parent cell and divide again into sex cells. The result is that the sex cells have slightly different genetic information than the parent cells and only one-half the number of chromosomes. When sex cells combine during fertilization, each parent contributes one set of chromosomes and his or her genetic diversity to the offspring. Many genetic disorders arise when problems occur during meiosis. For example, children may inherit too many or too few chromosomes from each parent. Down syndrome typically occurs when children inherit an extra 21st chromosome during fertilization (Frommlet et al., 2016).

Neurotypical individuals have the same genes; the differences in people's appearance come from slight variations

in these genes, called **alleles**. For example, all people have genes that determine their hair color. Different alleles influence whether someone will be a blonde, redhead, or brunette. These alleles are usually inherited from parents or develop spontaneously as a genetic mutation (Nussbaum, 2016).

Many people erroneously believe that genes determine behavior. For example, newscasters may incorrectly report that researchers have discovered a gene responsible for sexual orientation or a gene that makes people behave aggressively. Nothing could be further from the truth. Genes merely form a blueprint for the body's creation of proteins. Some of these proteins partially determine our hair color, eye color, or skin pigmentation. Others influence our height, body shape, and (sadly) our cholesterol. No gene directs behavior. However, genes can lead to certain structural and functional changes in our bodies that predispose us to behave in certain ways (Jaffee, 2016).

### Behavioral Genetics

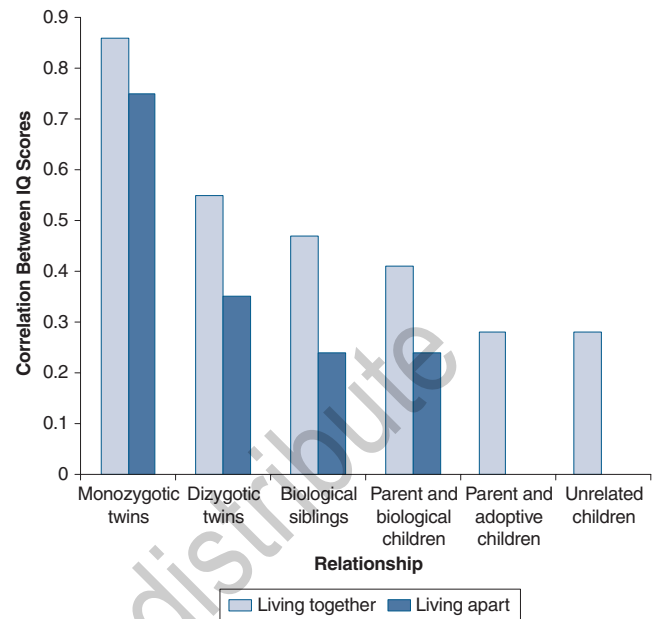
**Behavioral genetics** is an area of research that examines the relationship between genes and behavior. Behavioral geneticists use three approaches to identify the relative contributions of genetic and environmental influences on development. The first, and simplest, approach is by conducting a *family study*. In a family study, researchers determine whether a certain characteristic is shared by members of the same family. If the characteristic is partially determined by genetics, biologically related individuals are more likely to share the characteristic than unrelated individuals.

For example, researchers have examined the heritability of children's intelligence using family studies. If we look at the light bars in Figure 2.2, we see that the correlations of IQ scores are higher among biological relatives than among non-biological relatives. Behavioral **concordance** is expressed as the correlation between individuals, ranging from 1.0 (i.e., perfect similarity) to 0 (i.e., no similarity). The mean correlation between two biological siblings' IQ scores is approximately .45, whereas the mean correlation between two unrelated children's IQ scores is only about .27. These findings suggest that genetic factors play a role in children's intelligence.

The primary limitation of family studies is that they do not adequately control for environmental effects. Although it is true that biological relatives share similar genes, they also usually live in similar environments. Most family members share the same house, live in the same neighborhood, and come from similar socioeconomic and cultural backgrounds. Therefore, when family studies indicate that closely related relatives are more likely to have a disorder than more distant relatives, we cannot determine whether this similarity is due to common genes or similar environments.

To tease apart the relative effects of genes and environment on behavior, behavioral geneticists conduct *adoption studies*. In an adoption study, researchers examine children who were separated from their biological families shortly after birth. If a behavioral attribute is influenced by genetics, we would

**FIGURE 2.2** ■ The Effects of Genes and Environment on Intelligence



*Note:* Behavioral geneticists use family, adoption, and twin studies to estimate the heritability of intelligence. Based on Sattler (2019).

expect children to show greater similarity to their biological relatives than to their adoptive relatives.

For example, the mean correlation between parents and their biological children's IQ scores is approximately .40. In contrast, the mean correlation between parents and their adoptive children's IQ scores is only .25. Because children show greater similarity to their biological parents than their adoptive parents, we can conclude that genetic factors play unique roles in the development of children's intelligence.

The primary weakness of adoption studies is that parents who adopt children are often not typical of parents in the general population. Adoption agencies carefully screen prospective adoptive parents before placing a child in their custody. Consequently, adoptive parents are less likely to have mental health problems and are more likely to have higher income and educational backgrounds than other parents. Furthermore, parents who offer their children for adoption often have higher rates of mental illness and come from more disadvantaged backgrounds than parents in the general population. These differences between biological and adoptive families may partially account for the greater similarity between children and their biological parents compared to their adoptive parents.

A third way that behavioral geneticists identify the relative contributions of genes and environment on behavior is by conducting a *twin study*. In a twin study, researchers compare the concordance between monozygotic (MZ; identical) and dizygotic (DZ; fraternal) twins. MZ twins are the products of the same egg and sperm cell; consequently, they have a 100% genetic similarity. DZ twins are the products of different egg

and sperm cells; consequently, they share only 50% of their genes, like other biological siblings. The correlation between IQ scores for MZ twins is .85, whereas the correlation for DZ twins is only .55. The higher concordance for MZ twins than DZ twins indicates that intelligence is at least partially genetically determined.

In some cases, twin and adoption studies are combined by examining twins who both live with their biological parents (e.g., the light bars in Figure 2.2) and twins separated at birth (e.g., the dark bars in Figure 2.2). For example, the mean correlation in IQ for MZ twins reared together is .85, whereas the mean correlation for MZ twins reared apart is also very high: .75. The high correlations for twins reared together or apart indicate that genetic factors play important roles in the development of intelligence. Even twins separated shortly after birth have remarkably similar IQs.

Behavioral geneticists often divide environmental influences into two types: shared environmental factors and nonshared environmental factors. **Shared environmental factors** are experiences common to siblings. For example, siblings usually are reared by the same parents, grow up in the same house, attend the same schools, and belong to the same church. Shared environmental experiences make siblings more alike. In contrast, **nonshared environmental factors** are experiences that differ among siblings. For example, siblings may have different friends, play different sports, or enjoy different subjects in school. Siblings may also have different types of relationships with their parents. These nonshared environmental factors often account for more of the variance in children's behavior than do shared experiences. Nonshared environmental factors help to explain why siblings can be so different even though they grow up in the same home (Plomin, DeFries, Knopik, & Neiderhiser, 2017).

## Molecular Genetics

Another way to study the effects of genes on behavior is to examine children's genes at the molecular (rather than the behavioral) level. Recent advances in our knowledge of the human genome and in gene research technology have allowed scientists to search for specific genes that might be partially responsible for certain disorders (Kornilov & Grigorenko, 2016).

Recall that in neurotypical individuals, genes show natural variation, called alleles. **Molecular genetics** is the scientific field in which researchers attempt to link the presence of specific alleles with certain attributes, behaviors, or disorders. One way to identify which alleles might be responsible for specific disorders is to conduct a *linkage study*. In a linkage study, researchers search the entire genetic structure of individuals (i.e., perform a "genome scan"), looking for the presence of certain alleles and the existence of a specific disorder. If researchers find certain alleles in individuals with the disorder and do not find these alleles in people without the disorder, they hypothesize that the allele is partially responsible for the disorder (Schulze & McMahon, 2019).

Researchers tend to use linkage studies when they do not know exactly where to look for genes responsible for the

disorder. Given the magnitude of the human genome, it is difficult to identify links between certain alleles and specific disorders. However, researchers have successfully used linkage studies to identify alleles responsible for disorders caused by single genes, such as Huntington's disease. Linkage studies have been less successful in identifying the causes of disorders that depend on the presence or absence of multiple genes.

An alternative technique is to conduct an *association study*. In an association study, researchers select a specific gene that they believe might play a role in the emergence of a disorder. Then, they examine whether there is an association between a particular allele of this "candidate" gene and the disorder (Jaffee, 2016).

For example, researchers hypothesized that a specific gene, which affects the neurotransmitter dopamine, might play a role in the development of attention-deficit/hyperactivity disorder (ADHD). They suspected this particular gene because abnormalities in dopamine have been identified as a specific cause for ADHD. Furthermore, medications that affect dopamine in the brain can reduce ADHD symptoms. The researchers identified a group of children with and without ADHD. Then, they examined whether the two groups of children had different alleles for the candidate gene. The researchers found that a certain allele for this gene was much more common among youths with ADHD compared to youth without the disorder. Consequently, they concluded that the gene may be partially responsible for ADHD (Langley, 2019).

Of course, molecular genetics research is much more complicated than has been described here. Nearly all mental disorders are influenced by multiple genes; there is almost never a one-to-one relationship between the presence of a specific allele and the emergence of a given disorder. Furthermore, genes never affect behavior directly; their influence on behavior is always influenced by environmental experience (Kornilov & Grigorenko, 2016).

## Review

- Genes come in different variants, called alleles. The alleles we inherit from our parents can influence our physical attributes (e.g., hair and eye color) as well as our risk for developing certain disorders.
- Behavioral geneticists conduct family, adoption, and twin studies to determine the heritability of psychological characteristics like intelligence, personality, and mental health problems.
- Molecular geneticists conduct linkage and association studies to identify specific genes that may underlie certain disorders.

## How Do Genetic and Environmental Factors Interact?

### The Diathesis–Stress Model

Genes guide our maturation, but they do not determine our development. Our **genotype** refers to the genetic code that we



inherit from our parents. In contrast, our **phenotype** is the observable expression of our genetic endowment. Our phenotype is determined by the complex interaction between our genes and our environment (Grigorenko et al., 2016).

The **diathesis–stress model** can be used to explain the way genes and environments interact and affect development. According to this model, a child exhibits a disorder when an underlying genetic risk for the disorder is triggered by a stressful experience or life event. Both genetic risk and an environmental stressor are necessary for the disorder to emerge; the genetic risk or environmental experience alone is insufficient to bring about the disorder (Plomin et al., 2017).

We can see the usefulness of the diathesis–stress model in a famous study conducted by Avshalom Caspi and colleagues (2003). The researchers followed a large group of children from early childhood through early adulthood in order to examine the relationship between child maltreatment and depression later in life. As we might expect, children exposed to maltreatment were at risk for depression later in life. However, whether a maltreated child developed depression depended on his or her genotype (Figure 2.3).

Children who did not experience maltreatment were at low risk for depression later in life, regardless of their genes. However, children exposed to severe maltreatment displayed different outcomes, depending on their genotypes. Specifically, children who inherited one or two short alleles of the serotonin transporter gene were likely to develop depression in adulthood. Interestingly, this gene regulates the neurotransmitter serotonin, a chemical that plays an important role in mood regulation. The short version of this gene seems to place children at risk for depression if they also experience maltreatment. In contrast, children who inherited two long alleles of the serotonin transporter gene were not more likely to develop

depression in adulthood, even if they were exposed to maltreatment. The long version of this gene seems to protect children from the effects of stressful life events.

The diathesis–stress model is especially helpful in explaining multifinality, the tendency of children exposed to the same environmental stressor to show different developmental outcomes. In Caspi and colleagues' (2003) study, maltreated children showed divergent outcomes depending on their genetic risk.

### Gene–Environment Correlation

The diathesis–stress model shows that both genes and environment influence development. A second influential model, developed by Sandra Scarr and Kathleen McCartney (1983), shows that genes and environments are not independent. According to the **gene–environment correlation model**, we sometimes select environments that complement our genotypes. Specifically, there are three types of gene–environment correlations: passive, evocative, and active.

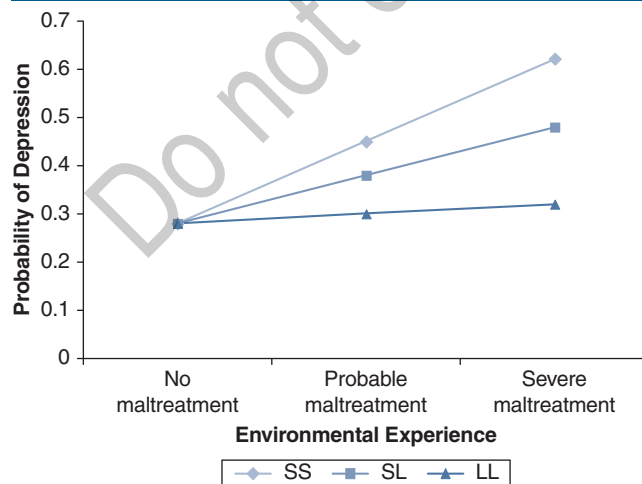
Although our biological parents determine our genotype, they also determine the quality of our early environmental experiences. Our genes and early experiences are related. For example, parents with high intelligence may pass on this genetic predisposition to their children. At the same time, because of their high intelligence and (perhaps) income, these parents have access to higher-quality medical care, nutrition, childcare, and schools. Intelligent parents speak and read to their children frequently, provide stimulating educational toys, and take their children on outings. In this manner, their children *passively* receive genotypes and early environmental experiences conducive to high intelligence.

As children develop, their phenotype gradually emerges from the interaction between their genotype and early environment. Like their parents, they may begin to show signs of above-average intelligence. They show well-developed verbal skills, learn more quickly than their peers, perform more tasks independently, and are curious about a wide range of topics. These behaviors *evoke* certain responses in others. School personnel may identify these children as gifted and provide them with more enriched educational experiences. They may be admitted into accelerated classes in high school and gain academic scholarships to selective colleges.

As children continue to develop, they *actively select* environmental experiences conducive to their genotype. For example, they might develop friendships with other bright children with similar interests and hobbies; seek out extracurricular activities that satisfy their curiosity in science, music, or art; and select challenging and rewarding majors in college. In a sense, youths select their own environments based on the cumulative influence of their genes and early experiences.

Now that you know the basics of gene–environment correlation, consider Kirby (From Science to Practice). Can you explain the emergence of Kirby's problems using the concept of passive, evocative, and active gene–environment correlation?

**FIGURE 2.3 ■ The Diathesis–Stress Model**



*Note:* Children's likelihood of depression depends on their genetic risk and an environmental stressor (i.e., maltreatment). SS = two short alleles, SL = one short, one long allele, LL = two long alleles. Based on Caspi and colleagues (2003).

## FROM SCIENCE TO PRACTICE

### UNDERSTANDING GENE-ENVIRONMENT CORRELATION



Kirby is a 10-year-old boy who attends the third grade at a local public school. Kirby failed first grade and will likely fail again this year. Kirby's reading is well below average, and he makes frequent mistakes in math. His writing skills are also poor. The school psychologist did not find evidence of a learning disability; however, psychological testing revealed below-average intelligence.

Kirby is frequently disruptive and inattentive during class. His teacher stated that Kirby's parents "just don't care." She has tried to contact his mother by telephone, but she usually does not return her calls and rarely follows through with her suggestions for home tutoring. Kirby will likely be sent to a remedial "special ed" class next year if improvements are not made.

Socially, Kirby is awkward. He is larger and taller than his classmates. He is teased because of his size, his poor grades, and the frequent reprimands he receives from teachers. Classmates also make fun of Kirby because of his name, his old "Walmart clothes," his poorly cut hair, and

the fact that he always "smells like hot dogs"—due to his family's wood burning stove.

Kirby has few friends in his class. After school, he often hangs around with older kids at the junior high school. Kirby has been caught smoking on a few occasions and teachers also suspect some alcohol use. He is also beginning to pick on younger children after school.

Kirby's problems include poor academic skills, disruptive behavior at school, and rejection by peers. They can be explained using the three types of gene-environment correlation.

1. Kirby's parents *pass* their genes on to him—genes that may have placed him at risk for low academic achievement. Furthermore, his parents also provide him with an early environment that is not conducive to good grades. They may not be able to afford high-quality schools and do not seem involved in his education. Consequently, Kirby struggles with reading and acts out in class.
2. Kirby's poor academic skills and appearance *evoke* negative reactions in others. His teacher is frustrated with his antics, and his classmates dislike him.
3. Kirby is beginning to *actively select* surroundings that are conducive to his genes and emerging disruptive behaviors. Rejected by children his age, Kirby associates with older boys who introduce him to cigarettes and alcohol.

If you were Kirby's therapist, how might you use the concept of gene-environment correlation to intervene and help Kirby establish a new developmental pathway?

### Epigenetics

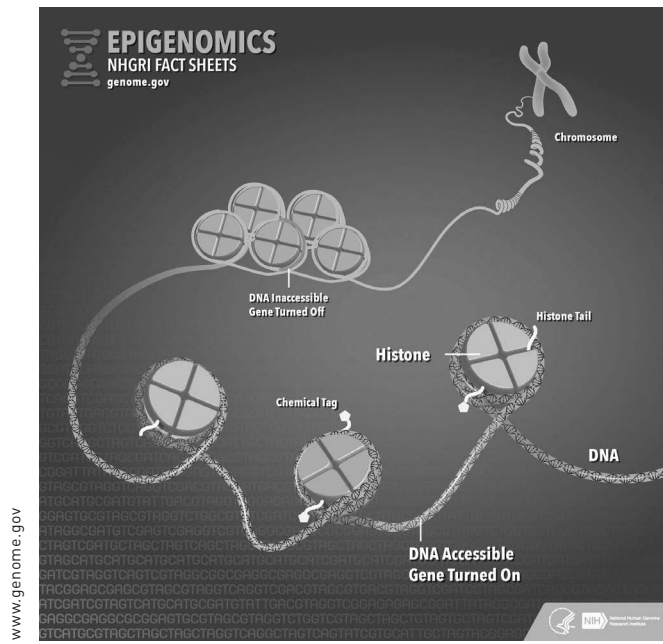
According to the diathesis-stress model, children will develop a disorder only if they have both a genetic risk for the disorder and an environmental stressor to trigger its onset. Moreover, gene-environment correlations show that our genotype and our environment are not independent; we sometimes select environments that are conducive to our genes. A new area of research called **behavioral epigenetics** shows that environmental factors can also directly affect the expression of our genes and our risk for mental health problems (Hill & Toth, 2016).

Recall that our genetic makeup consists of DNA, which is organized into genes and chromosomes in each of our cells. Genes direct the building of proteins that allow each cell to specialize and carry out its essential functions. These proteins influence our health, appearance, thoughts, feelings, and actions.

Epigenetic structures consist of chemical compounds and proteins that attach to our DNA and turn genes on or off.

These compounds and proteins are not part of our genetic code; consequently, scientists call them epigenetic (i.e., above the genome). When these epigenetic structures attach to DNA and regulate its expression, scientists say they have "marked" the genome. Although these marks do not change the DNA itself, they do alter the way in which cells use the DNA's instructions. These epigenetic marks can be passed on to new cells when they divide. Moreover, epigenetic marks can also be passed down from one generation to the next.

Epigenetic compounds can affect the expression of DNA in two ways (Image 2.4). In a process called *DNA methylation*, proteins attach chemical tags (called methyl groups) to certain portions of genes, turning them on or off. In another process called *histone modification*, DNA wraps either tightly or loosely around histones. Segments of DNA that are loosely wrapped can be expressed, whereas other segments that are tightly wrapped cannot (National Human Genome Research Institute, 2019).



**IMAGE 2.4.** Chemical tags and histones, which are not part of the genome itself, affect the expression of individual genes and can influence behavior.

Environmental experiences can change epigenetic structures. Certain environmental factors such as diet, smoking, and exposure to disease have been shown to alter structures, leading to different expressions of the genetic code. Epigenetic structures are heritable. Although much of the epigenome is reset when parents pass their genes to their children, some structures persist and affect the child's phenotype (Cicchetti, 2019).

Researchers at McGill University first demonstrated the effects of epigenetics on behavior in rats (Weaver et al., 2004). Rat pups have a certain gene that regulates their stress response. This gene is wrapped tightly around a histone that prevents it from becoming active. The researchers found that nurturing behaviors of the mother toward the pups (e.g., licking, grooming) caused this portion of the gene to unwind from the histone, allowing it to be expressed. When these pups reached adulthood, they were better able to cope with stress than rats whose mothers were less nurturing. Subsequent research showed that these epigenetic changes affected the care these rats gave to their own offspring, thus passing on this stress response to the next generation (Masterpasqua, 2009).

Researchers are only beginning to understand how epigenetics might help explain the development of disorders in children. In one recent study, researchers examined the caregiving behaviors of depressed and nondepressed mothers. As we might expect, depressed mothers expressed more negative emotions toward their infants than nondepressed mothers. Moreover, the infants of depressed mothers showed different epigenetic structures than the infants of nondepressed mothers, suggesting that these early caregiving experiences might affect children's epigenetic activity. Longitudinal research is needed to determine whether these epigenetic changes, brought on by early experience, might affect children's subsequent behavior (Moore, 2015).

Other research has begun to examine the epigenetic structure of children with existing behavior problems. In one of the largest studies so far, researchers examined children and adolescents referred to mental health clinics because of disruptive behavior. The researchers found that children's stress hormones and their severity of behavior problems were associated with changes in their epigenetic structure, specifically, structures associated with the expression of the cortisol receptor gene. This finding is interesting because cortisol is the body's main stress hormone; furthermore, the cortisol receptor gene plays a role in regulating the body's stress response. Epigenetic changes to the expression of this gene might underlie some of the problems shown by these youths (Dadds, Moul, Hawes, Mendoza Diaz, & Brennan, 2016).

We are only beginning to appreciate how behavioral epigenetics can help us understand the emergence of childhood disorders. Perhaps equally as important, research might someday be helpful in developing medications that can affect epigenetic structures, genetic expression, and risk for mental health problems (Nigg, 2016b).

### Review

- According to the diathesis–stress model, children must have both (1) a genetic risk and (2) an environmental stressor to develop a disorder. The model helps explain multifinality, that is, the tendency of children with similar genes or experiences to have different outcomes.
- The gene–environment correlation model assumes that our genes and environments are related. There are three types of gene–environment correlations: passive, evocative, and active. Their relative importance changes across development.
- Epigenetic structures (e.g., methyl tags and histones) can turn genes “on” or “off.” These structures, which are not part of children's genotype, can be altered by environmental experiences and passed down from one generation to the next.

### How Does the Brain Change Across Development?

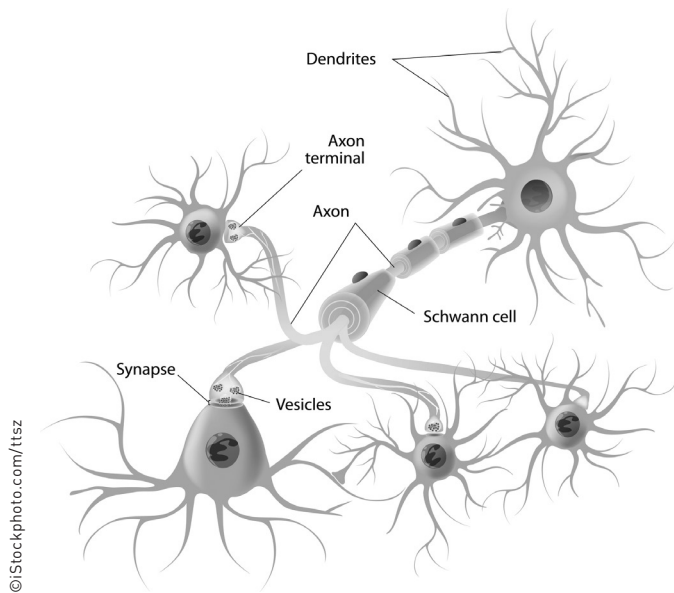
Scientific advances have given us increasingly more detailed pictures of the brain and nervous system from infancy through adolescence. Studies examining children over time have yielded several principles of brain development (Roberts, 2020).

#### 1. The brain consists of 100 billion neurons.

A **neuron** is a nerve cell that is typically very narrow and very long. Most neurons are small. You could place 50 neurons side by side within the period that ends this sentence. Neurons vary from 1 millimeter to more than 1 meter in length. Neurons are also very numerous; if you counted each neuron in your brain, one neuron per second, it would take you more than 3,000 years to finish.

The structure of a neuron can tell us something about its function. The center of most neurons contains the cell body.





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**IMAGE 2.5.** Neurons relay information down their axons electrically. They communicate with other neurons using chemical messengers called neurotransmitters.

Its main purpose is to perform metabolic functions for the cell, that is, to keep the cell alive. The neuron also has dendrites, fingerlike appendages that receive information from either outside stimuli (e.g., light, pressure) or other neurons. Finally, the neuron has a longer axon, which relays information from the dendrites and cell body to the terminal endings of the neuron. Neurons relay information electrically, by controlling the positively and negatively charged particles that are allowed to enter the cell. Information is conducted down the axon in a manner analogous to electricity flowing down a wire. Mammalian axons are wrapped in a fatty substance called myelin (produced by Schwann cells), which increases conduction and speeds the electrical impulse (Image 2.5).

### 2. Neurons communicate using chemical messengers.

Each neuron typically forms many connections with other neurons, forming a complex neural network. Although information travels within neurons electrically, it travels between neurons chemically. When an impulse reaches the end of an axon, it triggers the release of a chemical messenger called a **neurotransmitter**. The neurotransmitter is released into the synapse, a small cleft between neurons. In the synapse, neurotransmitters can be detected by other neurons, causing them to change their electrical charge. Sufficient stimulation by neurotransmitters can cause other nerve cells to become active, thus sending the impulse to the next neuron.

Neurotransmitters have different functions. Some are *excitatory*—that is, they increase the positive charge of neurons, making them more likely to become active. For example, dopamine is an excitatory neurotransmitter that is important for attention and concentration. Insufficient dopamine in certain brain regions is associated with ADHD. Other neurotransmitters are *inhibitory*—that is, they increase the negative charge of neurons, making them less likely to become active. For

example, gamma aminobutyric acid (GABA) is an inhibitory neurotransmitter. Alcohol causes an increase in GABA, slowing reaction time, judgment, and decision-making. Most psychotropic medications and drugs affect behavior by enhancing or attenuating the effects of neurotransmitters.

### 3. The brain is organized from the bottom up.

Evolutionarily older areas of the brain develop first, followed by more complex, higher-order brain regions. For example, the **brain stem** consists of the *medulla*, *pons*, and *midbrain* and is largely responsible for basic metabolic functions such as heart rate, respiration, and arousal. It is developed at birth and is necessary to keep us alive (Ganzel & Morris, 2016).

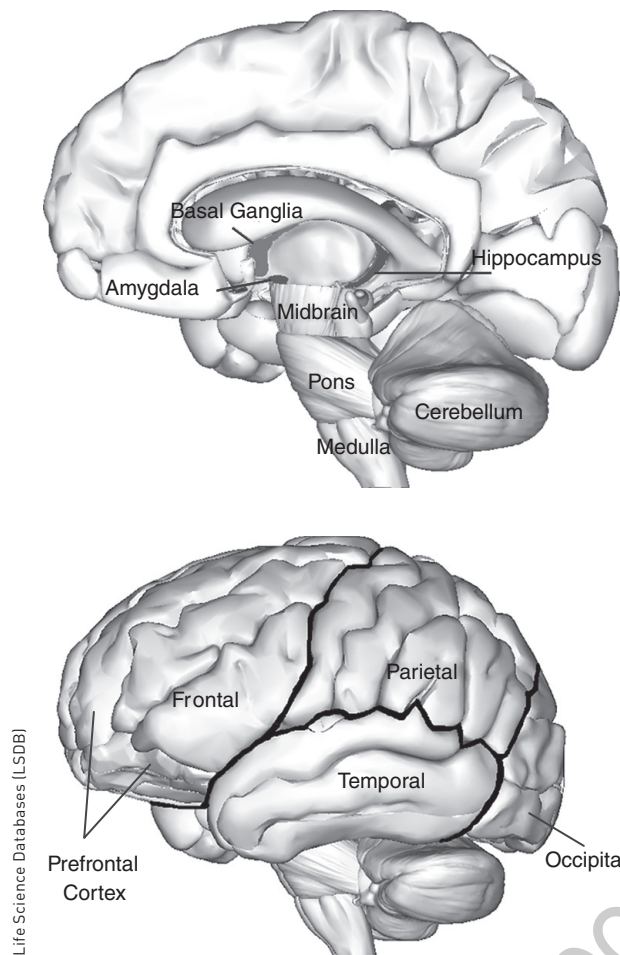
Similarly, the **cerebellum** is a brain region located near the back of the brain; it is chiefly responsible for balance and coordinated motor activity. It develops rapidly during the first year of life. Interestingly, the cerebellum undergoes a second round of maturation during early adolescence. Researchers believe the cerebellum plays a role in mental gracefulness and efficiency in addition to adroitness in physical movement. Maturation of the cerebellum during adolescence might explain the increased physical gracefulness exhibited by older adolescents as well as a general increase in mental efficiency across development.

Just above the brainstem, in the center of the brain, are two important regions that also mature relatively early. The **basal ganglia** are located between the brainstem and the higher-level cortical regions. The basal ganglia perform many important functions. One of their primary roles is to help control movement. Another function is to filter incoming information from the senses and relay this information to other brain regions where it can be processed. The basal ganglia have also been implicated in the regulation of attention and emotions. Researchers believe that structural changes in the basal ganglia during childhood and adolescence might account for children's increased motor functioning, attention, and emotional processing during the school-age years.

Finally, the **limbic system** is located deep inside the brain, behind the cortex. Two important components of the limbic system are the *amygdala* and *hippocampus*. The amygdala aids in our understanding and expression of emotions, especially negative feelings, such as fear and rage. The hippocampus also plays a role in emotional processing, especially the formation of emotion-laden memories (Image 2.6).

### 4. Higher-order regions may not mature until adulthood.

The **cerebral cortex** is the outermost shell of the brain. It is divided into four lobes. The *occipital lobe*, located near the back of the brain, is primarily responsible for visual processing. This brain region appears to undergo the most change from birth through age 2 years. In contrast, the volume of the *parietal lobe* (located on the sides and top of the brain) peaks around age 6. The parietal lobe is primarily responsible for integrating visual, auditory, and tactile information. The *temporal lobe* (located on the sides and bottom of the brain) also shows peak growth during the first 6 years of life. The temporal lobe has multiple



**IMAGE 2.6.** Important brain regions include the brain stem (medulla, pons, midbrain), cerebellum, basal ganglia, and limbic system (amygdala, hippocampus) shown in the top image and the lobes of the cortex shown in the bottom image.

functions, including hearing, language, and the expression and regulation of emotions.

The volume of the *frontal lobe* peaks in late childhood or early adolescence. The frontal cortex plays an important role in language production, problem-solving, and memory—skills that develop rapidly during childhood. A particular region of the frontal lobe, the prefrontal cortex, shows peak growth in early adolescence and reorganization into early adulthood. This brain region is responsible for planning, organizing, and prioritizing activity to meet long-term goals. Development of the prefrontal cortex is believed to underlie young adults' increased capacity for attention, inhibition, and overall self-regulation (de Haan & Johnson, 2016).

##### 5. Experience can affect the brain.

Although it may seem that brain maturation determines development, the relationship between maturation and behavior is bidirectional. The brain can change in response to experience. Biological maturation and environmental experiences interact in three ways to shape the developing brain (Cicchetti, 2019).

First, certain aspects of brain development are *gene driven*. These aspects are largely impervious to the effects of

experience and almost entirely determined by genetics. For example, the development of the brain stem and migration of neurons from the center of the brain to the cortex is believed to be genetically preprogrammed. Developmental psychologists sometimes refer to this importance of genes over experience in embryonic development as *canalization* (Blair, Raver, & Finegood, 2016).

Second, some aspects of brain development are *experience expectant*—that is, the formation of the brain region is partially dependent on information received from the environment. Infants have an overabundance of neural connections, many of which they do not need. Connections that are used are maintained and strengthened while connections that are not used atrophy and die. Whether a connection is maintained or pruned depends on experience. For example, an infant exposed to the Japanese language during the first few years of life may strengthen neural connections responsible for processing the sounds used in Japanese. However, infants not exposed to Japanese during this early period of development may lose neural connections that play a role in processing this language. Consequently, children who are not exposed to Japanese in infancy or early childhood may find it difficult to speak the language without an accent. Developmental psychologists often refer to periods of development in which experience can greatly shape neural structure and functioning as *developmentally sensitive periods*.

Third, brain development can be *experience dependent*—that is, environmental experiences in later life can lead to the formation of new neural connections or to changes in the brain's organization or structure. **Neural plasticity** refers to the brain's malleability, that is, its capacity to change its structure and/or functioning in response to environmental experiences. These experiences can be either internal or external. Internal experiences alter the immediate environment of the brain and nervous system. For example, exposure to too much testosterone or stress hormone can lead to structural changes in various brain regions. In contrast, external experiences come from outside the organism. For example, an infant exposed to environmental toxins can experience brain damage (Cicchetti, 2015).

Neuroscientists have discovered that the brain is remarkably adaptive to environmental stressors, especially when these stressors occur early in life. Perhaps the most striking example of brain plasticity is seen following a surgical procedure called a functional hemispherectomy. This surgery is performed on some children who have medically intractable epilepsy that arises in one hemisphere of the brain. These seizures cause severe impairment, occur very frequently, and are not responsive to medication. The surgeon removes the entire parietal lobe of the nonfunctional hemisphere (the origin of the seizures) and severs the corpus callosum, a bundle of neurons that allow the seizure to travel from one hemisphere to the other.

Despite removal or disconnection of several brain regions, children usually show remarkable recovery from the surgery. Children often experience weakness or mild paralysis on the opposite side of the body. Furthermore, if the left hemisphere

is removed, most children experience problems with language. However, children usually recover much of this lost functioning within 6 to 12 months after surgery, as the remaining hemisphere gradually assumes many of these lost functions. In fact, most children who undergo this surgery are able to return to school 6 to 8 weeks later (van Schooneveld, Braun, van Rijen, van Nieuwenhuizen, & Jennekens-Schinkel, 2016).

Positive environmental experiences can also lead to the formation of new neural connections. Long ago, the neuropsychologist Donald Hebb (1949) proposed that the simultaneous activation of neurons can cause the neurons to form new connections. Hebb suggested “neurons that fire together, wire together.” Recently, neuroscientists have been able to show **synaptogenesis**, that is, the formation of new neural connections due to experience. For example, rats reared in enriched living environments (e.g., given extra space and access to toys and mazes) show differences in brain structure and functioning compared to rats reared in typical cages. Humans who receive extensive training in Braille show growth in brain regions responsible for processing the sense of touch. Even skilled musicians show a reorganization of brain regions responsible for controlling the finger positions of their instruments (Cicchetti, 2019).

### Review

- The brain consists of 100 billion neurons that form trillions of synaptic connections. Neurons relay information within themselves electrically; they communicate between one another using chemical messengers called neurotransmitters.
- Brain development is characterized by rapid growth followed by periods of neuronal pruning. Development begins in evolutionarily older brain regions (e.g., brainstem, basal ganglia, limbic system) and ends in regions responsible for higher-order functions (e.g., the cerebral cortex).
- Development can be gene driven, experience expectant, or experience dependent. Environmental experiences can lead to synaptogenesis and the reorganization of neuronal connections (i.e., plasticity).

## 2.3 PSYCHOLOGICAL INFLUENCES ON DEVELOPMENT

### How Is Learning Theory Important to Understanding Childhood Disorders?

Psychologists often use **learning theory** to explain and predict children’s overt actions. From the perspective of learning theory, children’s behavior is largely determined by environmental contingencies. Learning occurs in three ways: (1) through classical conditioning, (2) through operant conditioning, and (3) through imitation or modeling.

### Classical Conditioning

In **classical conditioning**, learning occurs when the child associates two stimuli paired together in time. One stimulus is initially called the neutral stimulus (NS) because it does not elicit a response. The other stimulus is initially called an unconditioned stimulus (UCS) because it elicits an unlearned or unconditioned response (UCR). The child may come to associate the NS with the UCS if the two stimuli are presented together in time.

Pavlov demonstrated that dogs would associate the sound of a metronome (NS) with the presentation of meat powder (UCS) if the two stimuli were presented contiguously. After repeated presentations, the metronome alone elicited salivation. After conditioning, the previously neutral stimulus (e.g., metronome) is referred to as the conditioned stimulus (CS), whereas the resulting response (e.g., salivation) is referred to as the conditioned response (CR).

Classical conditioning can be used to explain the emergence of certain childhood disorders. For example, a boy who is bitten by a dog might associate the sight of a dog (NS) with the experience of being bitten (UCS). The dog bite, in turn, naturally causes a fear response (UCR). Later, the presence of any dog (CS) may elicit a similar fear response (CR). The boy might develop a phobia for dogs.

Consider another example. A girl is taking notes in her high school math class when she suddenly experiences a panic attack. The attack is so severe that she immediately leaves class and runs to the bathroom for privacy and safety. The girl associates her classroom (NS) with the panic attack (UCS), which naturally causes intense negative emotions (UCR). Later, any thought of reentering her classroom (CS) might elicit feelings of apprehension or anxiety (CR). She might develop a fear of going to school.

One way of decreasing behaviors acquired through classical conditioning is to repeatedly expose the CS until the severity of the CR decreases. When the CS no longer elicits the CR, we say that *extinction* has occurred.

Exposure therapy is a primary treatment for most anxiety disorders. In a process called *graded exposure*, extinction occurs gradually. For example, a therapist might recommend



**IMAGE 2.7.** Graded exposure is like dipping your toe into a cold pool until you are used to its temperature. Flooding is like jumping in.

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that a boy with a fear of dogs gradually spend more time with dogs, in order to extinguish this fear. Initially, the boy might simply look at pictures of dogs, then remain in a room with a dog on a leash, and finally pet a dog. After the boy is repeatedly exposed to the dog, the dog's presence no longer elicits an intense fear response (Image 2.7).

In a process called *flooding*, extinction occurs rapidly—usually within one session. For example, a girl with a fear of school might enter her math classroom with her therapist and remain there until her panic subsides. Although flooding is a more rapid treatment than graded exposure, it is less frequently used with children because it causes greater distress.

### Operant Conditioning

Whereas classical conditioning occurs when children associate two stimuli together in time, **operant conditioning** occurs when children associate an action with a consequence in the environment. Operant conditioning is based on the notion that the consequences of our actions determine the likelihood that the actions will be repeated.

If the consequences of our actions increase the likelihood that we will repeat the behavior in the future, these consequences have reinforced our behavior. **Reinforcement** can be positive or negative. *Positive reinforcement* occurs when an individual is presented with a stimulus that increases the likelihood of behavior. For example, a father might give his daughter ice cream after she eats her vegetables at dinner. If the presentation of ice cream following the meal increases the likelihood that the girl eats her vegetables in the future, we say that the ice cream positively reinforced the child's eating.

Many people mistakenly believe that the adjective “positive” in the term positive reinforcement refers to the pleasantness of the reinforcer. In fact, the term positive simply refers to the fact that the stimulus is presented to the individual. Some presumably pleasant stimuli are not positively reinforcing to all children. For example, providing a 2-year-old with one piece of candy for using the toilet may increase the likelihood that he will use the toilet in the future. However, providing one piece of candy to a 14-year-old for completing his math homework will likely not increase the likelihood that he will complete his math homework in the future.

Additionally, some presumably unpleasant stimuli can be positively reinforcing. For example, a teacher may reprimand her student for disrupting class. If the teacher's reprimand results in an increase in the student's disruptive behavior, the teacher's behavior is positively reinforcing, no matter how aversive it appears.

*Negative reinforcement* occurs when the withdrawal or avoidance of a stimulus increases the likelihood of behavior. For example, a father might allow his daughter to leave the dinner table only after she finishes her vegetables. If escaping the dinner table by eating vegetables increases the likelihood that the girl eats her vegetables in the future, we say that the father's actions negatively reinforced the child's eating.

Negative reinforcement often underlies childhood behavior problems. For example, a mother might ask her son to

turn off Netflix and clean his room. The son might ignore his mother because he prefers to watch his favorite program. The mother might withdraw her request and clean her son's room herself. If the mother's behavior (i.e., withdrawal of her request) increases the likelihood that her son will ignore her requests in the future, we say that her actions are negatively reinforcing his disobedience. She is teaching him to ignore her requests.

In contrast to reinforcement, **punishment** always decreases the probability of future behavior. There are two types of punishment: positive and negative. *Positive punishment* involves a stimulus presentation that decreases the likelihood of behavior. For example, a mother might spank her son for his disobedience. If spanking results in a decrease in her child's defiance, then it is a form of positive punishment. *Negative punishment* involves avoidance or removal of a stimulus that decreases the likelihood of behavior. For example, a teacher might remove a child from a desirable classroom activity following his disruptive behavior in class. If the teacher's actions result in a decrease in the student's disruptive behavior, then the teacher's behavior was a form of negative punishment (Table 2.2).

Clinicians prefer to use reinforcement, instead of punishment, to correct behavior problems. In some cases, however, punishment can be used therapeutically. For example, a therapist might teach a parent to use positive punishment to correct her son's bed-wetting. Each time the boy wets the bed, the parent might require the boy to perform a series of actions designed to correct the problem behavior. These actions might include stripping the bed, taking the bedding to the washing machine, helping to start the wash, putting on new sheets, and sitting on the toilet. Similarly, a therapist might teach a parent to use time-out as a form of negative punishment for her disruptive preschooler. Time-out involves removing the child from all potentially reinforcing stimuli for a period of time, in an attempt to decrease the child's defiance. The child might be required to sit in a special chair for 3 minutes with no access to toys, television, or other stimuli.

**TABLE 2.2 ■ Operant Conditioning**

		Stimulus	
		Applied (+)	Withdrawn (-)
Behavior	Increased (Reinforcement)	<b>Positive Reinforcement</b> <i>Giving a child dessert for finishing her vegetables.</i>	<b>Negative Reinforcement</b> <i>Allowing a child to leave the table for finishing her vegetables.</i>
	Decreased (Punishment)	<b>Positive Punishment</b> <i>Scolding a child for disrupting class.</i>	<b>Negative Punishment</b> <i>Making a child miss recess for disrupting class.</i>

*Note:* Reinforcement increases future behavior; punishment decreases it.

## Social Learning

Behaviors can also be acquired by observing others. Albert Bandura and colleagues (Bandura, Ross, & Ross, 1961) demonstrated that children who watched adults behaving aggressively toward a Bobo doll often imitated the adults' aggressive actions. Bandura's **social learning theory** proposed that learning through imitation or modeling was a primary mechanism of behavioral acquisition. Social learning was especially likely when models were similar to children in age and gender and when models were reinforced for their actions.

Modeling is also used to explain and to treat child behavior problems. For example, parents who model anxiety to their children can increase their children's likelihood of developing an anxiety disorder. A mother who is afraid of social situations might model this fear to her daughter. Specifically, she might avoid attending social gatherings and worry about appearing foolish in public. She might also tell her daughter that other people are critical and judgmental, thereby increasing her daughter's fear of social situations. As a result, her daughter might develop anxiety and a tendency toward social withdrawal (Knappe, Beesdo-Baum, Fehm, Lieb, & Wittchen, 2012).

A therapist might also use modeling as a means to reduce the daughter's social anxiety. Specifically, the therapist might ask the child's teacher to pair the girl with a "classroom buddy"—a female classmate who shows well-developed social skills and is willing to model appropriate social behavior. By watching her "buddy," the girl might discover that social situations are often pleasant and are rarely catastrophic. Consequently, her social anxiety may decrease (Scaini, Belotti, Ogliari, & Battaglia, 2016).

### Review

- Classical conditioning occurs when children associate two stimuli together in time. Behaviors acquired through classical conditioning can be extinguished using exposure techniques.
- Operant conditioning occurs when children associate a behavior with an environmental consequence. Reinforcement always increases the likelihood of future behavior; punishment always decreases the likelihood of future behavior. Reinforcement and punishment can be positive or negative.
- Social learning occurs when children acquire a behavior through imitation or modeling.

## How Is Cognitive Development Important to Understanding Childhood Disorders?

### Cognitive Development

**Cognitive development** refers to changes in a child's capacity for perception, thought, language, and problem-solving. Jean Piaget's stage theory provides a framework for thinking about

cognitive development in children and adolescents. According to this theory, development progresses through a series of four broad stages in an invariant sequence. Each stage is characterized by greater sophistication in children's cognitive abilities (Barrouillet, 2015; Carey, Zaitchik, & Bascandzjev, 2015).

Infants in the *sensorimotor stage* (0–2 years) develop an understanding of themselves and their surroundings largely through happenstance or trial and error. This stage is marked by the emergence of object permanence, the notion that objects exist even when the child cannot see them; pretend play, acting "as if" one object (e.g., a doll) is another (e.g., a real baby); and increased use of language. Deficits in motor skills, pretend play, and language during this stage can indicate a range of neurodevelopmental problems.

Preschoolers in the *preoperational stage* (2–6 years) engage in increasingly more sophisticated use of language and representational thought. They can form a more complex understanding of their world and can begin to plan their actions before engaging in them. Children in this stage develop theory of mind, that is, the notion that other people have mental states (i.e., "minds") that can be different from their own. As a result, children can begin to take the perspective of others, understand others' motives and feelings, and respond with empathy. Conditions such as autism spectrum disorder and social communication disorder are characterized by delays in theory of mind and empathic understanding.

School-age children (6–12 years) fall in the stage of *concrete operations*. Throughout elementary school, these children develop greater capacity for conservation, that is, understanding that objects may change in appearance, but their amount or quantity remains constant. Conservation is tied to the physical world rather than to abstract ideas. Consequently, children in this stage can learn about subjects connected to the physical world (e.g., arithmetic, reading) but are typically not ready for more abstract subjects (e.g., algebra, literary analysis).

Finally, adolescents ( $\geq 12$  years) achieve the stage of *formal operations*, characterized by logical-deductive reasoning. At this stage, adolescents can begin to use general principles to determine specific truths, enabling them to engage in more abstract thought. Formal operations allow adolescents and young adults to comprehend algebra and geometry, psychology and sociology, or philosophy and political science—subjects that young children cannot understand.

### Social Cognition

**Social cognition** is an important aspect of cognitive development that concerns our capacity to think about social situations. Social cognition is based on social information processing theory, a general model for how humans perceive, judge, store, and retrieve social information. Central to the notion of social cognition is the idea that we form *schemas*, or mental models about ourselves and others. These schemas are based on prior interpersonal experiences, and they guide and direct future social behavior. For example, a child with well-developed social skills and many friends might expect a new classmate to be

friendly. He might approach the new classmate and ask him to play during recess. In contrast, a child who is socially awkward and rejected by her peers might anticipate that a new classmate would also reject her. Consequently, she might avoid the new classmate (Bargh, 2013; Fiske & Taylor, 2013).

Problems with social information processing underlie many childhood disorders. For example, children who engage in aggressive behavior toward peers typically have negative schemas regarding themselves and others. Furthermore, when confronted with social problems, they tend to perceive others' actions as hostile or rejecting and have difficulty generating peaceful problem-solving strategies (Dodge, Godwin, & Conduct Problems Prevention Research Group, 2013). Similarly, children with depression often view themselves as ineffective in social situations. When confronted with social problems, they tend to shy away from others, often leading others to reject them, confirming their low self-worth. Fortunately, therapies have been developed to improve children's social information-processing skills and alleviate children's behavioral and emotional problems (Michl, McLaughlin, Shepherd, & Nolen-Hoeksema, 2013).

### Review

- Piaget identified four stages of cognitive development. These stages describe children's increased capacity for thinking, problem-solving, and language.
- Social cognition refers to children's ability to think about social situations and solve interpersonal problems. Some childhood disorders are associated with social problem-solving biases or deficits.

## How Is Emotional Development Important to Understanding Childhood Disorders?

### Emotional Development

**Emotional development** refers to the emergence and refinement of a child's experience, expression, understanding, and regulation of feelings (Odle, 2016). The process of emotional development reflects the child's physical maturation, increased cognitive complexity, and experiences with others (Cole, 2016).

Emotional expression begins in infancy. Crying is a powerful means of communication for newborns. Distress, pleasure, anger, fear, and interest are among the earliest emotions that infants display. Young infants occasionally laugh and smile, although smiling deliberately at others typically does not emerge until age 4 months. Emotions such as sadness and fear are typically seen in the second half of the first year of life.

Toddlerhood is characterized by rapid development of the brain's limbic system and frontal lobe as well as greater independence from parents. Consequently, toddlers begin to show more complex feelings such as pride (in asserting autonomy) and shame (in taking risks and failing). Between the ages of 3 and 5, children develop greater capacity for empathy. Empathy is dependent on their ability to attend to other's emotional

expressions, label them correctly, and take their perspective. Children with autism spectrum disorder typically show delays in their emotional expression and understanding of others' feelings.

Advances in cognition, especially language, allow preschoolers and young school-age children to label and to differentiate their own emotions. For example, kindergarteners can begin to distinguish feeling "mad" from feeling "sad." Young children also become better able to share their feelings verbally, rather than expressing them through aggression, crying, or throwing tantrums. Young children also learn how to alter their emotional expressions in different contexts. For example, the emotions a child can express at home might be different from the emotions he might show in the classroom or on a playground (Bridges, 2018).

### Emotion Regulation

A major task during childhood and adolescence is to develop increased capacity for emotion regulation. **Emotion regulation** refers to the processes we use to recognize, label, and control our feelings and the way we express these feelings through our actions. Emotion regulation is important to all aspects of development: it affects our attention, concentration, thought processes, memory, relationships, and ability to set and achieve long-term goals (Odle, 2016).

Children's ability to regulate their emotions changes over time. Initially, emotion regulation is highly dependent on others. For example, an infant might cry for his mother when he is cold or hungry and a toddler might run to his father when he skins his knee on the playground. Gradually, children develop strategies to regulate their emotions more independently. For example, an older child might ride her bike to alleviate her anxiety about school and an adolescent might go to the movies with friends to take his mind off trouble at home. The ability to regulate one's emotions independent of others is essential to social-emotional development (LeBlanc, Essau, & Ollendick, 2018).

The processes that children use to regulate emotions can be divided into two broad categories: effortful and reactive. *Effortful processes* involve deliberately changing one's attention, thoughts, or actions with the goal of increasing positive emotions or achieving long-term objectives. Imagine that a girl misses a free throw and her team loses an important basketball game. To regulate her emotions, she could engage in a wide range of effortful processes. For example, she could direct her attention away from her missed shot and, instead, focus on words of encouragement from her teammates like, "Don't worry about it. You'll get it next time." She could also reappraise the situation and think to herself, "Even professional basketball players don't make all of their shots." She could also look at the situation as a learning opportunity and resolve to practice her shooting (Eisenberg, Hernandez, & Spinrad, 2018).

In contrast, *reactive processes* are automatic responses to emotions that children adopt in a rigid or habitual manner. For example, the girl who missed the game-winning free throw



could respond by crying and running to the locker room, or she could tantrum or shove an opponent. Reactive processes like these may help the girl feel better in the short term, but they hinder her ability to reach long-term goals. She's unlikely to get much playing time after crying or fighting.

Many childhood disorders occur when children habitually and rigidly rely on reactive processes to regulate their emotions. For example, internalizing disorders, like anxiety and depression, occur when children react to stressful events through inhibition, avoidance, or withdrawal. In contrast, externalizing disorders, like conduct problems and ADHD, occur when children automatically respond to emotion-provoking experiences through aggression or impulsivity (Fernandes, Tan-Manusukhani, & Essau, 2018; Hannesdottir & Ollendick, 2018).

Other disorders also reflect difficulty with emotion regulation. For example, disruptive mood dysregulation disorder is seen in young children who exhibit chronic irritability and severe temper outbursts. Treatment for this disorder involves teaching children to avoid situations that might trigger tantrums and finding new ways to cope with negative emotions. Eating disorders also sometimes reflect underlying problems with emotion regulation. Some adolescents engage in bingeing or purging as a maladaptive way to reduce anxiety, depression, or low self-worth. Self-injurious behaviors, like burning or cutting, can also be seen as a problematic attempt to regulate emotions. The treatment of these disorders typically involves replacing these maladaptive emotion-regulation strategies with healthier, more effective coping skills (Baudinet, Dawson, Madden, & Hay, 2018; Kircanski, Leibenluft, & Brotman, 2019).

### Review

- Early emotional development is chiefly concerned with emotional expression and accurately understanding the feelings of others. Children with autism often experience problems developing these skills.
- Later emotional development focuses on increased capacity for emotion regulation, that is, the ability to recognize, label, and control our feelings and emotional displays. Children with conduct problems, anxiety, and mood disorders often have difficulty with emotion regulation.

## 2.4 SOCIAL-CULTURAL INFLUENCES ON DEVELOPMENT

### How Do Parents Influence Development?

#### Temperament and Goodness-of-Fit

**Temperament** refers to an infant's characteristic pattern of actions and emotions in response to environmental stimuli. It

is typically observable in the first few weeks after birth (Kagan, 2014). Temperament is relatively stable over time and across situations. Temperament reflects one aspect of personality that is believed to be largely innate. Children enter the world with a particular temperament that helps them make sense of their experiences. These experiences, in turn, interact with their temperament and shape their personalities (Stifter & Dollar, 2016).

Parents of two or more children can appreciate differences in temperament. One child may be relatively quiet, easy to calm when upset, yet timid in new situations. His sibling, however, may cry at the slightest provocation, be a poor sleeper and picky eater, and act like a daredevil on the playground. Temperament helps to explain why biological siblings, who share 50% of their genes in common and are raised by the same parents, can behave so differently.

The New York Longitudinal Study provides us with the best data regarding the relationship between temperament in infancy and personality later in life. In this study, Stella Chess, Alexander Thomas, and Herbert Birch (1965) categorized children into one of three temperament clusters:

1. *Easy children* tended to show a high degree of positive emotions during parent-child interactions, engaged in regular daily routines, and were at ease with new people and situations. They could be soothed quickly when upset. These children were classified as "easy" because they presented fewer problems to their caregivers.
2. *Difficult children* tended to display more negative emotions and irritability during parent-child interactions; showed more intense reactions to environmental stimuli; and experienced problems establishing regular eating, sleeping, and toileting schedules. They were more easily upset by changes to their routines or surroundings. These children were labeled "difficult" because their behavior presented challenges to their caregivers.
3. *Slow-to-warm-up children* tended to show little activity and emotion during parent-child interactions and appeared apprehensive when confronted with new people or situations. These children were considered "slow-to-warm-up" because they needed more time to adapt to changes in their surroundings.

The researchers discovered that the same dimensions of temperament could be observed in children of all ethnicities and socioeconomic groups. Infants tended to show stable temperament by 2 to 3 months of age. Most important was the **goodness-of-fit** between the infant's temperament and the demands and expectations of his or her environment. For example, a "difficult" baby raised by a single parent who is experiencing a high degree of stress might show more problems than a "difficult" baby raised by a single parent who has a safe home, a flexible job, and the support of family and friends.

Developmental psychopathologists explore the degree to which temperament might place children at risk for disorders later in life. For example, Jerome Kagan studied one dimension of temperament, emotional reactivity, which can be observed in 4-month-old infants. When presented with a novel stimulus, such as a dangling mobile, emotionally reactive infants appear distressed. In contrast, infants with low reactivity remained calm when presented with the same stimulus. When tested again at 14 and 21 months, reactive infants often displayed inhibition and fear in novel situations (e.g., when a clown entered the room), whereas infants low in reactivity tended to be more outgoing. Furthermore, children who were reactive in infancy and fearful as toddlers were at increased risk for developing anxiety disorders in later childhood (Fox et al., 2015).

It is important to remember that temperament does not determine personality or a child's risk for psychopathology. However, temperament can affect children's personality and subsequent interactions with others. For example, Nathan Fox conducted an impressive longitudinal study investigating the relationship between difficult temperament in infancy and the emergence of psychological disorders in adolescence and early adulthood. The study showed that young children with inhibited temperament were at increased risk for anxiety problems as young adults. However, children's peer networks during adolescence largely explained the relationship between early temperament and later anxiety. Inhibited children who avoided social contact and developed smaller peer networks tended to develop anxiety disorders; in contrast, inhibited children who were able to establish supportive peer networks did not show increased anxiety. These findings suggest that temperament can place children on certain developmental pathways, but temperament alone does not determine children's outcomes (Frenkel et al., 2015).

## Attachment

**Attachment** refers to the emotional bond between caregiver and child that serves to protect and reassure the child in times of danger or uncertainty (Grossman, Bretherton, Waters, & Grossman, 2016). According to John Bowlby (1969, 1973, 1980), the parent–child attachment relationship has three basic functions. Most important, the attachment relationship serves to protect the child from danger. Infants and young children are biologically predisposed to seek help from their parents when scared, upset, or unsure of their surroundings. At the same time, parents are predisposed to respond to their infant's bids for attention and care (Pasco Fearon, Groh, Bakermans-Kranenburg, van IJzendoorn, & Roisman, 2016).

Second, attachment provides parent–infant dyads with an avenue for sharing positive emotional experiences. Through interactions with parents, infants learn about the natural reciprocity of social interactions and the give-and-take of interpersonal relationships.

Third, attachment helps infants learn to regulate negative emotions and behaviors. Initially, infants control anxiety

and distress by relying on comfort from their caregivers. Over time, children develop **internal working models**, or mental representations of their caregivers, that help them cope with psychosocial stress. Infants learn to use these mental representations of their parents as a “secure base” from which to explore their surroundings and regulate their emotions and actions.

The quality of parent–child interactions over the first few years of life influences the initial quality of the attachment relationship. Parents who provide sensitive and responsive care to their children, by meeting their children's needs in a consistent and developmentally appropriate fashion, usually develop secure attachment relationships with their children. Their children, in turn, come to expect sensitive and responsive care from their parents. At the same time, these children come to view themselves as worthy of receiving sensitive and responsive care from others.

In contrast, parents who do not provide sensitive and responsive care in a consistent fashion are likely to foster insecure attachment relationships with their children. When scared or upset, these children do not expect their parents to effectively meet their needs and help them regulate their emotions. They adopt internal working models of their parents as unavailable or inconsistent. At the same time, they may view themselves as unworthy of receiving attention and care from others.

Mary Ainsworth and colleagues (1978) identified three patterns of attachment that develop over the first few months of life. These patterns can be observed in the behavior of 12-month-old infants using the **strange situation**, a laboratory-based test. The strange situation occurs in a playroom and involves separating infants from their parents for short periods of time. Most infants experience distress when separated. However, researchers are primarily interested in how infants respond to their parents when they are reunited. Specifically, researchers observe whether infants are able to use their parents as a means to reduce distress and return to play (Image 2.8).



**IMAGE 2.8.** The strange situation is used to assess infant–caregiver attachment. Does the child rely on his caregiver for comfort and use her as a secure base to explore his surroundings?

Most children who participate in the strange situation show *secure attachment* relationships with their parents. These children use their parents as a secure base from which to regulate their emotions, control their behavior, and return to play. Although they usually show considerable distress during separation, they seek comfort and physical contact with their parents when they are reunited. After a little while, reassurance from caregivers soothes these infants, and they can return to exploring the room.

In contrast, some infants develop *insecure–avoidant attachment* relationships with their parents. When reunited with their mothers, these infants show passivity and disinterest. In fact, many of these infants actively avoid their parents' bids for attention by turning away or ignoring them. Although these infants might be upset by separation, they appear uninterested or resentful of their parents when they return. Instead of using their parents as a secure base from which to regulate their emotions, these infants attempt to rely on themselves to cope with the stress of separation. Attachment theorists reason that parents who consistently dismiss their children's bids for attention foster insecure–avoidant attachment relationships with their infants.

Other infants develop *insecure–ambivalent attachment* relationships with their parents. When separated, these infants usually show considerable distress. However, when reunited with their parents, these infants alternate between seeking and resisting their caregivers' support. For example, an infant might initially motion to be picked up by her mother and then immediately push away. The behavior of these infants conveys the notion that they desperately want comfort from their parents but that they do not expect their parents to adequately provide for their needs. Attachment theorists reason that parents who alternate between providing care and ignoring their children foster this insecure–ambivalent pattern of attachment.

Ainsworth noticed that some infants could not be classified into any of the three original attachment patterns. In the strange situation, these infants tended to show repetitive, stereotyped behaviors when separated from their caregivers, such as jerky movements of their arms, neck, or back. When reunited with their caregivers, these infants tended to freeze, stare off into space, or act fearfully. Mary Main, a student of Ainsworth, classified these children as having *disorganized/disoriented attachment* because their behavior did not seem organized like those of other infants (Main & Solomon, 1986). Subsequent research showed that disorganized/disoriented attachment is associated with histories of neglect. Furthermore, many caregivers who developed disorganized/disoriented attachment relationships with their infants experienced a major loss or trauma shortly before or after their child's birth.

The Minnesota Longitudinal Study of Parents and Children examined relationships between mother–child attachment in infancy and children's developmental outcomes. Overall, its results showed that the development of secure attachment in infancy and early childhood is associated with

later social–emotional competence. For example, infants who formed secure attachment relationships tended to be more popular, resilient, resourceful, and cooperative in preschool. By age 6, they were more compliant, responsive, self-reliant, and empathic than children with insecure attachment histories.

In contrast, infants who developed insecure–avoidant attachment relationships were more likely to display behavior problems such as stealing, lying, or cheating. Others were at risk for mood problems, such as irritability, anger, and depression. They also exhibited more negative reactions from peers.

Infants who developed insecure–ambivalent attachments tended to show excessive dependency on caregivers at home and teachers in preschool. During the school-age years, they often acted frustrated, passive, or helpless. They required reassurance, at the expense of taking risks and engaging in other activities.

Finally, infants who showed disorganized/disoriented attachment were at greatest risk for behavior problems in childhood. Specifically, many of these children showed oppositional, defiant, or spiteful behaviors toward their caregivers. These children were also most likely to develop aggressive behavior and conduct problems. In adolescence, these children were at risk for dissociative symptoms, such as unexpected lapses in awareness or memory.

Although early parent–child attachment seems to place children on developmental pathways toward either competence or adversity, it does not determine children's destiny. Many children change their patterns of attachment from infancy to adolescence because of experiences with other caregivers. Supportive relatives, teachers, coaches, and friends can provide corrective emotional experiences to children who were initially insecure, causing them to modify their working models for relationships. Indeed, researchers have identified a subset of infants who changed their attachment patterns from insecure (in infancy) to secure (in childhood) largely because of sensitive and responsive care from adults in their lives. These children tend to show improvements in family and peer functioning by adolescence (van IJzendoorn & Bakermans-Kranenburg, 2014). Indeed, psychotherapy can be seen as a way to alter an individual's working model for relationships from one based on rejection or inconsistency to one based on sensitivity and trust.

## Parenting Behavior

Although parenting practices differ considerably across families and cultures, psychologists have identified at least two dimensions of parenting that are important to development (Kerig, 2016). The first dimension, *parental responsiveness*, refers to the degree to which parents display warmth and acceptance toward their children, orient their behavior to meet their children's needs in a sensitive and responsive fashion, and engage their children through shared activities and positive emotions. The second dimension, *parental demandingness*, refers to the degree to which parents have age-appropriate expectations



for their children's behavior, clearly establish and consistently enforce rules governing their children's actions, and supervise their children's activities (Bornstein, 2016).

Diana Baumrind (1991) classified caregivers into four **parenting types**, based on the degree to which they endorse responsive and demanding parenting behaviors. *Authoritative* parents are both responsive and demanding toward their children. These parents set high, but age-appropriate, expectations for their children's behavior and help their children meet these expectations by providing them with nurturance and support. They are assertive in their interactions with their children but not intrusive. They use discipline to support their children and to teach them how to regulate their own behavior; they do not use discipline punitively. They value responsibility but also recognize children's needs for sensitive and responsive care.

*Authoritarian* parents show high levels of demandingness but low levels of responsiveness. These parents value obedience and achievement in their children. They set high standards for their children and firm limits on their children's behaviors. They establish clear rules and expect them to be obeyed. These parents are highly involved in their children's lives, providing them with organized, structured, and supervised educational, extracurricular, and social experiences. They strive to teach self-reliance and responsibility to their children, but they may give their children less support and encouragement to live up to these responsibilities.

*Indulgent* parents show high levels of responsiveness but low levels of demandingness. These parents are described as lenient, nondirective, and permissive. They value autonomy and exploration in their children. They place few limits on their children's behaviors and are reticent to discipline.

*Uninvolved* parents show low levels of both responsiveness and demandingness. These parents display infrequent or inconsistent interactions toward their children, often because they are distracted by other psychosocial stressors (e.g., working multiple jobs, caring for an elderly relative).

Overall, children of authoritative parents display the best developmental outcomes. On average, these children show well-developed social skills, emotional competence, and capacity for self-regulation and self-direction. Children of authoritarian parents tend to perform well academically but are at risk for low self-esteem and peer problems, especially in late childhood and early adolescence. Children of indulgent parents often display high levels of self-esteem and well-developed social skills, but they are susceptible to behavior problems during childhood and substance use problems during adolescence. Children of uninvolved parents typically display the poorest outcomes. These children are at particular risk for low academic achievement, behavior problems, and emotional difficulties across development (Baumrind, 1991; Weiss & Schwarz, 1996).

## Review

- Temperament refers to the way infants and young children organize their behavior in response to novel

environmental stimuli. The goodness-of-fit between the children's temperament and their caregiving environment is important to development.

- Attachment refers to the emotional bond between caregiver and child that serves to promote safety. Attachment is innate; however, the quality of attachment depends on the sensitivity and responsiveness of the caregiver toward the child.
- Caregivers can be classified into one of four parenting types based on their responsiveness and demandingness: (1) authoritative, (2) authoritarian, (3) indulgent, and (4) uninvolved.

## How Do Peers Influence Development?

### Interpersonal Theory

Harry Stack Sullivan (1953) was an influential psychiatrist who developed one of the first comprehensive theories regarding the importance of friendships to social-emotional development. He believed that close, trusting friendships were vital to people's sense of self and their overall well-being. In contrast, Sullivan believed that loneliness is the most painful human experience possible.

Sullivan thought that intimacy is the hallmark of satisfying interpersonal relationships. According to Sullivan, intimate relationships are characterized by closeness and vulnerability between two people who value each other and regard each other as equals. Intimate relationships foster love and ward off feelings of anxiety, isolation, and loneliness. Sullivan identified several stages of interpersonal development, from infancy through adulthood, characterized by a greater capacity for intimacy in relationships (Image 2.9).

Young children's relationships (2–6 years) tend to be low in intimacy. Relationships are either between two people of unequal standing (e.g., parent and child) or two equals who do not have emotional closeness (e.g., two preschoolers playing with the same toys). Children's main task is to learn to



IMAGE 2.9. Peers are essential to children's social-emotional development.

delay gratification in order to maintain relationships over time. Children must learn to take turns, to share belongings, and to follow rules so that everyone can enjoy play. Some children will develop imaginary friends with whom they will “practice” these skills.

Slightly older children (6–9 years) begin to establish relationships with peers. Sullivan saw these friendships as critical for all later relationships. In the classroom and on the playground, school-age children decide which peers they like and dislike. By accepting another child into one’s play group, the child is saying, “I like and value you.” Acceptance establishes a sense of self-worth in children.

Sullivan described preadolescence (9–12 years) as a “quiet miracle” in which children begin to develop close relationships with one or more “best” friends. These friends act as a source of security and support in times of trouble. Sullivan believed these relationships can begin to foster love, a feeling that occurs when another person’s happiness and security becomes as important as the happiness and security of oneself. Sullivan believed that loving relationships allowed preadolescents to share their feelings without fear of rejection or humiliation and to take risks in exploring their identities and values.

Adolescence ( $\geq 13$  years) begins with puberty and ends with the establishment of loving and mutually supportive relationships with others. Sullivan saw early adolescence as a time of insecurity and self-doubt that can be managed through the emotional support of peers. In time, however, adolescents use their increased capacity for intimacy to initiate deep friendships and romantic relationships. Part of this transition involves viewing partners not as objects designed to gratify their needs but as autonomous individuals with their own identities, values, and intrinsic worth.

### Peer Acceptance and Rejection

The formation of relationships depends on cognitive, emotional, behavioral, and social factors (Hay, 2016; Prinstein & Giletta, 2016). First, the ability to form friendships depends on children’s cognitive development. Young children must be able to attend to the activities of others, imitate others’ actions, understand cause-and-effect relationships, and have basic competence with language. Children with autism, communication or learning disorders, and developmental disabilities may have trouble gaining acceptance from peers because of deficits in these areas.

Second, interpersonal relationships depend on the ability to accurately interpret others’ emotions, the capacity to regulate one’s own emotional expression, and the ability to empathize. As we have seen, youths with autism have difficulty understanding emotions and showing empathy. Children and adolescents with mood disorders also typically have problems with emotion regulation. Irritability, sadness, or social withdrawal can compromise their relationships with family and friends.

Third, children must be able to regulate their own behavior to make and keep friends. Children with ADHD and other disruptive behavior disorders are often rejected by peers because of their aversive, high-rate, or aggressive actions.

Finally, children need adequate social skills to form intimate relationships with others (McGinnis, 2011a, 2011b). These skills include knowing how to introduce yourself to a stranger, how to avoid a fight with a friend, and how to cope with social stress or peer pressure. Inadequate social skills can lead to peer rejection. Some peer-rejected youths develop depression and other mood problems, whereas other rejected youths associate with deviant peers who introduce them to antisocial behavior.

### Review

- Sullivan believed that close friendships are critical to children’s social and emotional competence. Friendships in childhood form the basis for future adult relationships based on mutual respect.
- Peer acceptance depends on behavioral, cognitive, and social–emotional competence. Problems in any of these areas can contribute to peer rejection and psychological problems.

## How Do Other Social–Cultural Factors Influence Development?

### Proximal and Distal Risk

Until now, we have focused chiefly on the immediate causes of childhood disorders. These causes include the child’s genotype, brain structure and functioning, learning experiences, thoughts and feelings, and relationships. These immediate determinants of children’s functioning are often referred to as *proximal risk factors* because they can directly affect children’s well-being. For example, a genetic disorder can lead to low intellectual functioning, whereas exposure to harsh, authoritarian parenting can contribute to children’s oppositional and defiant behavior. The overwhelming majority of research addressing the causes of child psychopathology focuses on proximal risk factors because they are typically the easiest to study (Tolan, 2016).

Researchers have increasingly turned their attention to other, *distal risk factors* for child behavior problems. Distal risk factors are social, cultural, and broad environmental influences on development. One important distal risk factor is socioeconomic status (SES). Children from low-SES families are at increased risk for developing behavioral and emotional disorders compared to youths from middle- and high-SES backgrounds. Other distal risk factors include family structure (e.g., single-parent families), neighborhood quality (e.g., population density, crime), and broader social–cultural values (e.g., importance of school, family, or religion; Wadsworth, Evans, Grant, Carter, & Duffy, 2016).

Distal risk factors, like poverty and neighborhood disadvantage, can *directly influence* child development. For example, infants and toddlers who ingest lead are at risk for developing behavioral and learning problems. Typically, youths are exposed to lead from paint that flakes off the walls of older

homes. Children from low-SES families are disproportionately exposed to lead-based paint because they often live in older, more dilapidated homes. Consequently, rates of lead poisoning, and subsequent neurological damage, are greatest among youths from low-SES families (Jennings & Fox, 2015).

Distal risk factors can also *indirectly influence* child development. For example, the degree to which parents argue over financial concerns predicts the extent to which they use harsh discipline with their children. Their harsh parenting behavior, in turn, predicts the emergence of their children’s behavior problems. In this case, financial stress contributes to children’s behavior problems indirectly, by increasing problematic parenting behavior (Lee, Lee, & August, 2012).

### Bronfenbrenner’s Ecological Systems Theory

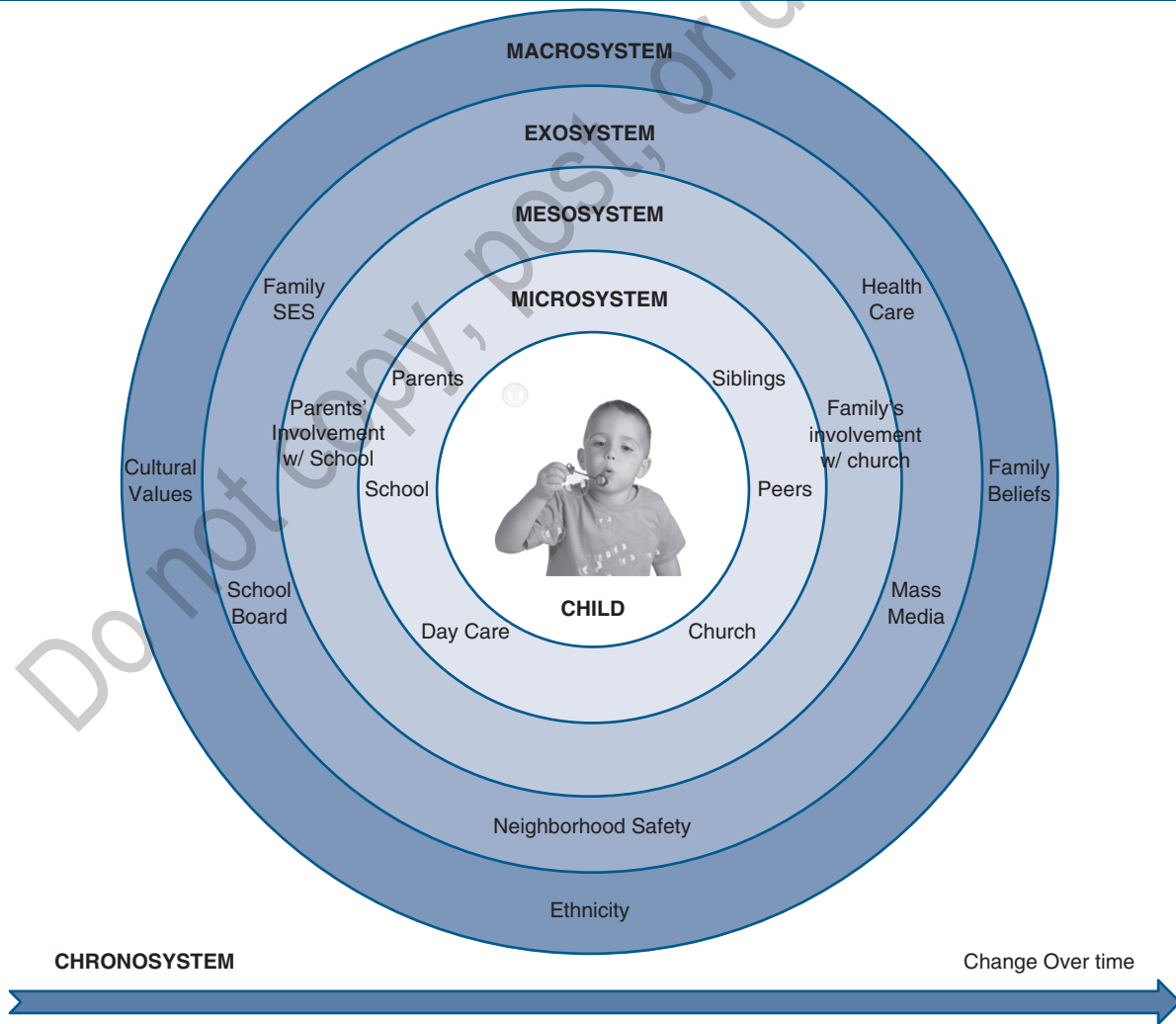
Perhaps the most influential and comprehensive explanation for the way social–cultural factors affect children has been offered by the developmental psychologist Urie Bronfenbrenner.

According to Bronfenbrenner’s (1979, 2005) **ecological systems theory**, children’s environment can be viewed as a hierarchy of concentric systems with each smaller system nested inside the others like stacked cups (Figure 2.4).

The *microsystem* reflects children’s immediate surroundings and proximal influences on their development. Factors within the microsystem include children’s genetic inheritance, biological functioning, psychological processes, and interactions with parents and family. The microsystem also includes children’s relationships with teachers, coaches, and peers as well the various social roles they adopt (e.g., student, athlete, friend). The microsystem is the “primary engine of development,” and children’s interactions with caregivers and friends are believed to be the most important proximal determinants of their developmental outcomes (Bronfenbrenner & Morris, 1998).

The *mesosystem* refers to the connections between microsystems. For example, children’s relationships at home and school are important determinants of their overall functioning.

**FIGURE 2.4 ■ Bronfenbrenner’s Ecological Systems Theory**



*Note:* Development is shaped by proximal and distal factors over time. Adapted from Bronfenbrenner (1979, 2005).



However, the quality of interactions between home and school also influences children's well-being. Children whose parents take an active role in their education, clubs, and sports will likely show different outcomes than children whose parents show less interest in their activities.

The *exosystem* reflects contextual influences that affect microsystems but do not affect children directly. For example, a father might be required to change work schedules or to work longer hours to keep his job. These work-related changes might influence the amount of time he is able to spend with his child. Similarly, the school board might decide to reduce funding for certain extracurricular activities, causing a child to give up a favorite sport or club. The parent's change in work schedule and the school board's change in funding can alter children's daily experiences and, consequently, indirectly affect their development.

The *macrosystem* refers to broad social, economic, and cultural influences on children's development. Chief among these factors are socioeconomic disadvantage, neighborhood quality, and media exposure. Other broad influences can include the family's religious beliefs, cultural values, and history (Tolan, 2016).

Bronfenbrenner recognized that the effects of all four systems on development change over time. In fact, he considered time to be a fifth system in his model—the *chronosystem*. Time shapes development in two ways. First, the importance of various systems depends on children's age and developmental level. For example, peers are more important

to children's developmental outcomes in later childhood and adolescence than they are during the preschool years. Second, different generations of children are exposed to different risks. For example, children born in the first half of the 20th century faced the dual threats of the Great Depression and World War II. Their children and grandchildren, in turn, lived through the Vietnam era and Cold War. Children today face new risks: domestic and international terrorism, environmental catastrophes, and serious illnesses like COVID-19. Each generation of children and adolescents must find ways to respond to stressors like these. A full understanding of child development depends on an appreciation for children's interactions with these environmental systems and how these interactions vary across time (Shelton, 2019).

### Review

- Proximal risk factors directly affect children's development. Distal risk factors include broader social and cultural influences that affect children indirectly through family, schools, neighborhoods, or society.
- Bronfenbrenner's ecological systems theory views child development as occurring within a series of nested social systems ranging from the microsystem (e.g., immediate influences) to the macrosystem (e.g., indirect influences). Development must also be understood in the context of time.

## Key Terms

**Adaptive behavior:** Thoughts, feelings, and actions that allow children to develop social, emotional, and behavioral competence over time and meet the changing demands of the environment

**Alleles:** Alternative forms of a gene that are inherited or arise by mutation

**Attachment:** The affective bond between caregiver and child that serves to protect and reassure the child in times of danger or uncertainty

**Basal ganglia:** Brain regions located under the cortex; they help to control movement, filter incoming information, relay information to other regions, and regulate attention and emotions

**Behavioral epigenetics:** A scientific field of study that examines the ways environmental experiences can affect genetic expression and be passed from one generation to the next

**Behavioral genetics:** An area of scientific study that examines the relationship between genes and behavior;

chiefly interested in determining the heritability of traits or disorders

**Brain stem:** An evolutionarily old region of the brain responsible for many basic life-sustaining functions; consists of the medulla, pons, and midbrain

**Cerebellum:** A brain region located posteriorly (in the back); chiefly responsible for balance and coordination

**Cerebral cortex:** The outermost layer of the brain, consisting of the frontal, parietal, occipital, and temporal lobes

**Chromosomes:** Threadlike strands of genes organized in 23 pairs in typically developing humans

**Classical conditioning:** A type of learning in which two stimuli are paired together in time, and a previously neutral stimulus comes to elicit an automatic, unconditioned response

**Cognitive development:** Changes in a person's capacity for perception, thought, language, and problem-solving

**Concordance:** Used by behavioral geneticists to describe the probability that two people will both have a certain characteristic or disorder given that one has the characteristic

**Developmental pathways:** Possible courses or trajectories of children's behavioral, cognitive, or social-emotional development over time, ranging from adaptation to maladaptation

**Developmental psychopathology:** A multidisciplinary approach to studying adaptive and maladaptive development across the lifespan. According to this perspective, development is shaped by the complex interaction of biological, psychological, and social-cultural factors over time

**Developmental tasks:** Behavioral, cognitive, or social-emotional challenges that children face at each age or developmental level

**Diathesis-stress model:** A broad theory that posits that a child will exhibit a disorder when she has both (1) an underlying genetic risk for the disorder and (2) an environmental experience or life event that triggers its onset

**Ecological systems theory:** A theory of child development that consists of concentric nested systems, each progressively more distal from the child: microsystem, mesosystem, exosystem, macrosystem, chronosystem

**Emotional development:** The emergence and refinement of a person's experience, expression, understanding, and regulation of feelings

**Emotion regulation:** The processes that people use to recognize, label, and control our feelings and our expression of these feelings

**Equifinality:** Describes the phenomenon in which children with different developmental histories show a similar developmental outcome

**Gene:** Thousands of nucleotides that form part of a chromosome; they are transferred from parent to offspring and influence the characteristics of those offspring

**Gene-environment correlation model:** The idea that our environments are partially influenced by our genotypes; there are three types of correlations: (1) passive, (2) evocative, and (3) active

**Genotype:** The genetic code that we inherit from our parents

**Goodness-of-fit:** The compatibility of a child's temperament with the features of his or her environment, especially parenting behavior

**Heterotypic continuity:** The phenomenon in which symptoms change over time, but their underlying pattern remains the same (e.g., a boy's ADHD symptoms change from childhood to adulthood, but he still has underlying problems with inhibition)

**Histones:** Proteins found in cells; they act as spools around which DNA winds; they regulate the expression of genes, turning them "on" or "off"

**Homotypic continuity:** The phenomenon in which disorders persist over time relatively unchanged (e.g., a boy with intellectual disability continues to have this disorder as an adult)

**Internal working model:** In attachment theory, a mental representation of a caregiver that helps an individual cope with psychosocial stress

**Learning theory:** A broad explanation for the causes of behavior that relies on classical conditioning, operant conditioning, and modeling

**Limbic system:** Located deep within the brain, responsible for emotional processing and memory; consists of the amygdala, hippocampus, and several other structures

**Maladaptive behaviors:** Thoughts, feelings, and actions that interfere with children's social, emotional, and behavioral competence or do not meet the changing demands of the environment

**Molecular genetics:** An area of scientific study that examines the relationship between specific genes and the presence or absence of characteristics and disorders

**Multifinality:** Describes the phenomenon in which children with similar early experiences show different social, emotional, and behavioral outcomes

**Neural plasticity:** A term used to describe the brain's capacity to change its structure or functioning in response to environmental experience

**Neurons:** Nerve cells; consist of dendrites, a cell body (soma), an axon, and terminal endings; relay information within themselves using electrical signals

**Neurotransmitters:** Chemical messengers that allow neurons to communicate with each other; examples are dopamine and serotonin

**Nonshared environmental factors:** Experiences that differ between siblings (e.g., different age, gender, friends, sports, or hobbies)

**Operant conditioning:** A type of learning in which an action is associated with an environmental consequence, either reinforcement or punishment

**Parenting types:** A four-part classification of parenting behavior based on its degree of responsiveness and demandingness: authoritative, authoritarian, indulgent, uninvolved

**Phenotype:** The observable expression of our genetic endowment

**Probabilistic epigenesis:** A principle of developmental psychopathology; refers to the manner in which genetic, biological, and social-cultural factors interact over time to influence (but not absolutely determine) development

**Protective factors:** Influences that buffer the negative effects of risks on children's development and promote adaptive functioning

**Punishment:** In operant conditioning, an environmental consequence that decreases the likelihood of future behavior

**Reinforcement:** In operant conditioning, an environmental consequence that increases the likelihood of future behavior

**Resilience:** The tendency of some children to develop social, emotional, and behavioral competence despite the presence of multiple risk factors

**Risk factors:** Influences on development that interfere with the acquisition of competencies or compromise children's ability to adapt to their environments

**Shared environmental factors:** Environmental experiences common to siblings (e.g., same parents, house, school)

**Social cognition:** Refers to a person's capacity to think about social situations and to perceive, interpret, and solve interpersonal problems

**Social learning theory:** The idea that people learn from one another through observation, imitation, and modeling

**Strange situation:** A laboratory-based test of infant-caregiver attachment; can be used to determine attachment security

**Synaptogenesis:** An increase in the number of neurons and connections between neurons; arises from maturation and experience

**Temperament:** An inborn tendency to organize and react to behavior in response to environmental stimuli

## Critical Thinking Exercises

- Mrs. Johnson referred her 5-year-old son, Billy, to a psychologist because Billy showed problems with oppositional and defiant behavior (e.g., crying, throwing tantrums, sassing back). The psychologist observed Mrs. Johnson and Billy during a 20-minute play session in the clinic. During the session, Mrs. Johnson repeatedly yelled at Billy and threatened to spank him. How might Billy's behavior problems be explained by the *transaction* between Billy and his mother?
- Are you and your biological siblings alike? Although you and your brother or sister might have been raised by the same parents and grew up in the same home, you might have different personalities, interests, and goals for the future. Use the concept of shared and nonshared environmental factors to explain why two biological siblings who grow up in the same household can be so different.
- Savannah is a 12-year-old girl who is extremely shy in social situations. She loves computer programming and graphic design and wants to take a class this summer to develop her skills. However, she is afraid to go. How might you use graded exposure to help Savannah overcome her anxiety about attending the class?
- Bruno is a 14-month-old infant who participates in the strange situation. When left alone, Bruno becomes greatly upset and cries considerably. However, when his mother returns to the room, he runs to her, motions to be picked up, and sinks into her arms. An observer comments, "Bruno doesn't seem to be securely attached. He's so easily upset when his mother leaves!" Is this statement accurate?
- Diana Baumrind discovered that children from authoritative families often show the best developmental outcomes. However, most research supporting this conclusion has been conducted with middle-class, non-Latino White families. How might SES or ethnicity affect the relationship between parenting behavior and children's outcomes?



## Test Yourself and Extend Your Learning

Videos, flashcards, and links to online resources for this chapter are available to students. Teachers also have access to PowerPoint slides to guide lectures, a case study

book (with answers) to prompt classroom discussions, and exam questions. Visit [abnormalchildpsychology.org](http://abnormalchildpsychology.org).

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