



Olaf Doering / Alamy Stock Photo

9

Physical and Cognitive Development in Middle Childhood

"I scored a goal today!" 8-year-old Christina exclaimed. Now that she can run faster and kick a ball farther than ever before, Christina enjoys playing on her elementary school soccer team and is becoming more skilled in the sport. Christina hopes to attend soccer camp this summer. Not only does she like playing soccer but she also likes learning about her favorite soccer players and memorizing game-related statistics. Advances in cognition have led Christina to enjoy other hobbies that

require concentration and planning, such as making complex collages and playing video games with intricate plots. An increasingly sophisticated vocabulary, emerging social reasoning skills, and an ability to understand other people's perspectives aid Christina in expressing herself and communicating her needs. Is Christina a typical school-age child? In this chapter, we examine the physical and cognitive changes that children undergo in middle childhood, from about ages 6 to 11.

Learning Objectives

- 9.1** Identify patterns of physical and motor development during middle childhood and common health issues facing school-age children.
- 9.2** Discuss school-age children's capacities for reasoning and processing information.
- 9.3** Summarize views of intelligence, including the uses, correlates, and criticisms of intelligence tests.
- 9.4** Examine patterns of moral development during middle childhood.
- 9.5** Summarize language development during middle childhood.
- 9.6** Discuss children's learning at school.

PHYSICAL AND MOTOR DEVELOPMENT IN MIDDLE CHILDHOOD

- » **LO 9.1** Identify patterns of physical and motor development during middle childhood and common health issues facing school-age children.

In middle childhood, physical development is more subtle and continuous than earlier in life. School-age children's bodies gradually get bigger, and they show advances in gross and fine motor development and coordination.

Body Growth

Growth slows considerably in middle childhood. Despite a slower growth rate, though, gradual day-to-day increases in height and weight add up quickly and can seem to sneak up on a child. In middle childhood, children grow 2 to 3 inches and gain 5 to 8 pounds per year, so that the average 10-year-old child weighs about 70 pounds and is about 4½ feet tall. In late childhood, at about age 9, girls begin a period of rapid growth that will continue into adolescence. During this time, girls gain about 10 pounds a year, becoming taller and heavier than same-age boys. As we will discuss in Chapter 11, not until early adolescence, at about age 12, do boys

Digital Resources

Explore: Attachment Insecurity and High-Calorie Food Consumption

Watch: Information Processing Theory

▶ **Lives in Context Video 9.1:** Piaget's Conservation Tasks

▶ **Lives in Context Video 9.2:** Executive Function

Listen: The IQ Test Wars

Explore: Moral Reasoning and Aggression

Explore: What's Worth Talking About?

Connect: Black Teachers Improve Lives for Black Students

enter a similar period of rapid growth. As children grow taller, their body proportions become more like those of adults, slimmer and with longer limbs.

Genes and nutrition influence the rate of children's growth. African American children grow faster and are taller and heavier than White children of the same age. For example, 6-year-old African American girls tend to have greater muscle and bone mass than White or Mexican American girls their age (Ellis, Abrams, & Wong, 1997). Children who enter middle childhood with stunted growth and nutritional deficits often do not catch up. Instead, stunting often continues and worsens in middle childhood, especially if children remain in the same environments that caused malnourishment (Kitsao-Wekulo et al., 2013). For example, growth stunting in children in sub-Saharan Africa tends to persist and worsen throughout the school years (Senbanjo, Oshikoya, Odusanya, & Njokanma, 2011). Children who enter middle childhood with stunted growth are likely to experience a variety of problems, including cognitive deficits, aggression, behavior problems, and a greater risk of chronic illnesses and other health problems (Hoddinott, Alderman, Behrman, Haddad, & Horton, 2013).

Motor Development

Like growth, motor development advances gradually throughout childhood. Motor skills from birth to age 4 predict school-age children's motor abilities (Piek,

FIGURE 9.1

Gross Motor Skills



In middle childhood gross motor skills combine and become more complex, permitting faster running, higher jumping, and greater coordination, such as the ability to balance on a balance beam.

canstock/sergeevspb, canstock/kzenon, Comstock/Stockbyte/Thinkstock

Dawson, Smith, & Gasson, 2008). During the school-age years, the gross motor skills developed in early childhood refine and combine into more complex abilities, such as running and turning to dodge a ball, walking heel to toe down the length of a balance beam and turning around, or creating elaborate jump rope routines that include twisting, turning, and hopping (Gabbard, 2018). Increases in body size and strength contribute to advances in motor skills, which are accompanied by advances in flexibility, balance, agility, and strength. Now children can bend their bodies to do a somersault or carry out a dance routine, balance to jump rope, demonstrate agility to run and change speed and direction rapidly, and have the strength to jump higher and throw a ball farther than ever before, as shown in Figure 9.1.

Children also show advances in fine motor control that allow them to develop new interests. School-age children build model cars, braid friendship bracelets, and learn to play musical instruments—all tasks that depend on fine motor control. Fine motor development is particularly important for penmanship. Most 6-year-old children can write the alphabet, their names, and numbers in large print, making strokes with their entire arm. With development, children become able to use their wrists and fingers to write. Uppercase letters are usually mastered first; the lowercase alphabet requires smaller movements of the hand that require much practice. By third grade, most children can write in cursive. Girls tend to outperform boys in fine motor skills (Junaid & Fellowes, 2006). Success

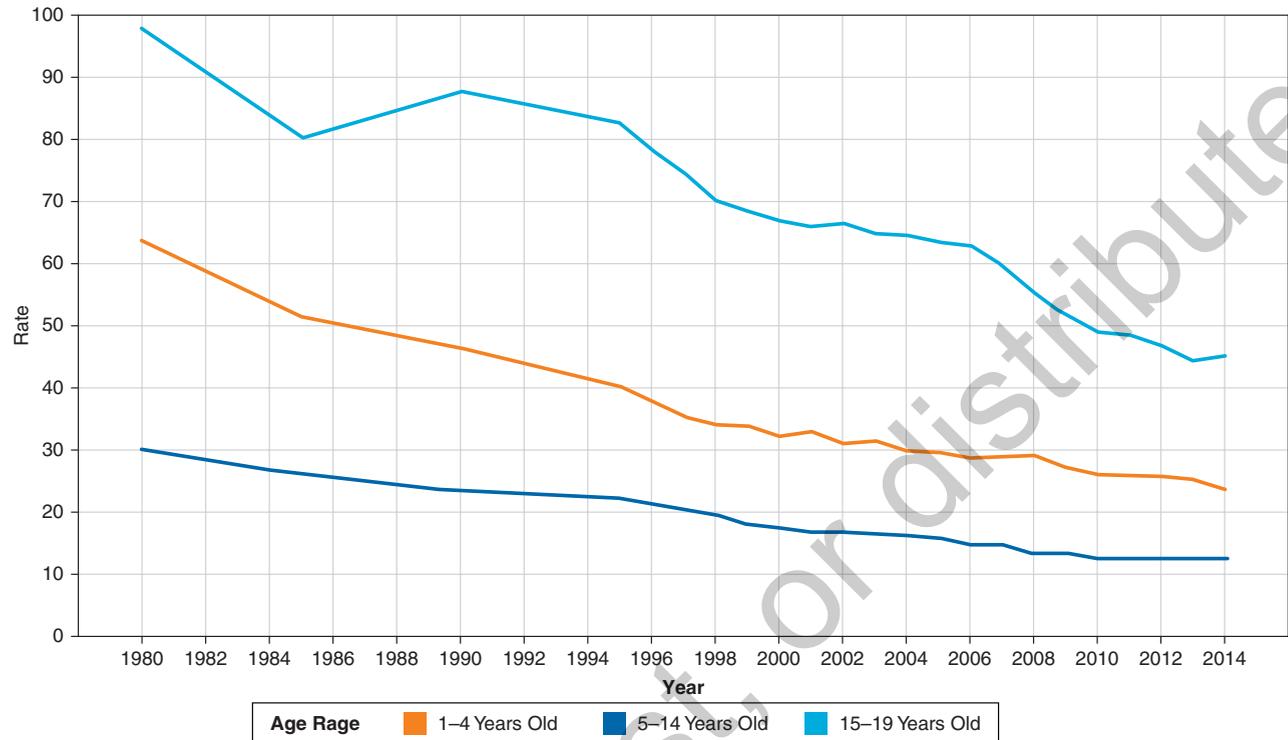
in fine motor skills, particularly writing skills, may influence academic skills. Children who write with ease may be better able to express themselves in writing, for example.

Motor skill advances are influenced by body maturation and brain development. The pruning of unused synapses contributes to increases in motor speed and reaction time so that 11-year-old children tend to respond twice as quickly as 5-year-old children (Gabbard, 2018). Growth of the cerebellum (responsible for balance, coordination, and some aspects of emotion and reasoning) and myelination of its connections to the cortex contribute to advances in gross and fine motor skills and speed (Tiemeier et al., 2010). Brain development improves children's ability to inhibit actions, which enables children to carry out more sophisticated motor activities that require the use of one hand while controlling the other, such as throwing a ball, or that require the hands to do different things, such as playing an instrument (Diamond, 2013).

Contextual influences, such as nutrition, opportunities to practice motor skills, and health, also influence motor development. For example, children in different contexts have different opportunities to practice motor skills through vigorous physical play and other activities (Laukkanen, Pesola, Havu, Sääkslahti, & Finni, 2014). In addition, motor development has long-term implications for other domains of development. In one study, children's motor development and activity at age 8 predicted measures of cognitive development and academic

FIGURE 9.2

Death Rates for Children Ages 1 to 19 (deaths per 100,000) in the United States, 1980–2014



Source: Child Trends Databank (2016).

achievement 8 years later, at age 16 (Kantomaa et al., 2013). The ability to explore the world and play influences opportunities to interact and play with other children and thereby affects social and cognitive development.

Common Health Issues in Middle Childhood

Middle childhood generally is a healthy time. As shown in Figure 9.2, childhood mortality declines after infancy. In addition, mortality across childhood has declined over the past four decades (Child Trends Databank, 2016). However, children from low socioeconomic status (SES) homes have higher rates of mortality than do other children because of poor access to health care, poor nutrition, and stressful home and neighborhood environments (Baker, Currie, & Schwandt, 2017).

Childhood Injuries

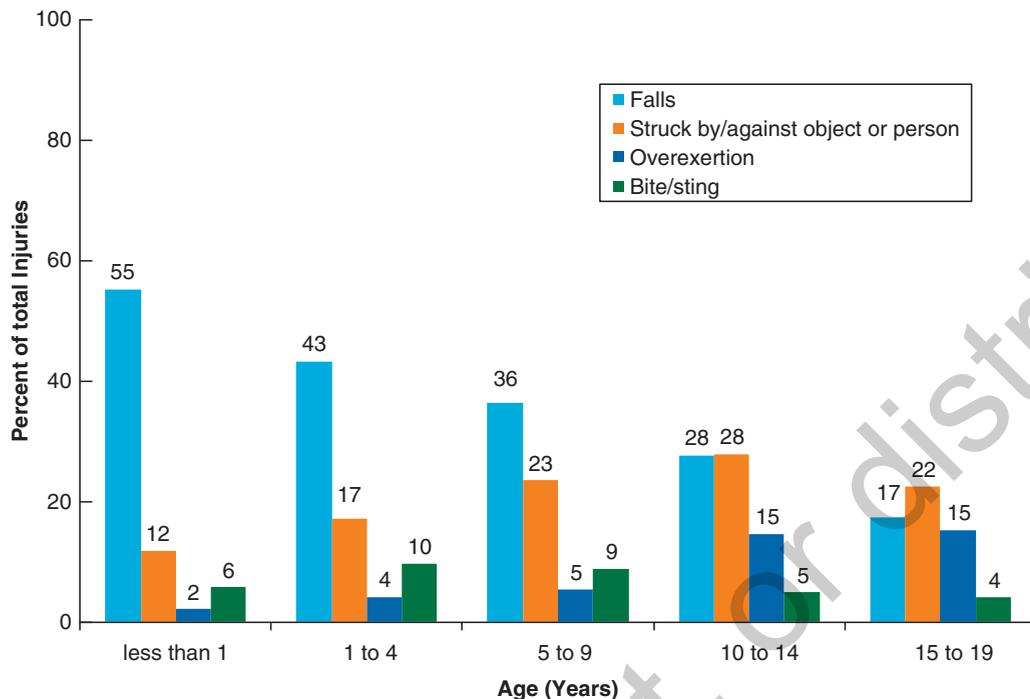
Unintentional injuries from accidents are the most common cause of death in children and adolescents in the United States, causing about one in five deaths (Dellinger & Gilchrist, 2018; Xu, Murphy, Kochanek,

& Bastian, 2016). Motor vehicle accidents are the most frequent cause of fatal injuries in children ages 5 to 19 (Safe Kids Worldwide, 2015). Many more children incur nonfatal injuries. Rates for nonfatal injuries vary dramatically with age and are highest in infancy and adolescence, ages 15 to 19 (Child Trends Databank, 2014). At all ages, males experience more injuries than females, likely due to their higher levels of activity and risk taking. The most common types of injuries also vary with age, as shown in Figure 9.3. Falls are the most common source of injuries in children under age 9; from age 10 to 14, children are equally likely to be injured by a fall or being struck by an object or person (Child Trends Databank, 2014). Adolescents are the most likely to be injured by being struck by an object or person.

A variety of individual and contextual influences place children at risk of injury. Poor parental and adult supervision is closely associated with childhood injury (Ablewhite et al., 2015). Children's risk of injury rises when their parents report feeling little control over their behavior (Acar et al., 2015). Some parents hold the belief that injuries are an inevitable part of child development and may therefore provide less supervision and intervention (Ablewhite et al., 2015). Children who are impulsive, overactive, and

FIGURE 9.3

Nonfatal Injuries Treated in Emergency Rooms, Leading Causes by Age Group, 2013



Source: Child Trends Databank (2014).

difficult, as well as those diagnosed with attention-deficit/hyperactivity disorder (ADHD), experience higher rates of unintentional injuries (Acar et al., 2015; Lange et al., 2016). Childhood injury is also associated with parental distraction, such as by talking to another parent or mobile phone use (Huynh, Demeter, Burke, & Upperman, 2017). Parents who work long hours or multiple jobs and who live in challenging environments may find it difficult to keep tabs on their children or may feel overwhelmed.

Neighborhood disadvantage, specifically low SES and lack of resources, is associated with higher rates of injuries and bone fractures in children in the United States, Canada, and the United Kingdom (McClure, Kegler, Davey, & Clay, 2015; McDonnell, 2014). Disadvantaged neighborhoods may also contribute to children's injuries due to factors that increase overall injury risk, such as poor maintenance of streets and sidewalks and poor design or maintenance of housing and playgrounds. In addition to having fewer opportunities to be active, children in disadvantaged neighborhoods often have inadequate access to sources of healthy nutrition; this combination of circumstances can interfere with the development of healthy, strong bodies.

Just as there are multiple contextual factors that place children at risk of injury, there are many opportunities for preventing and reducing childhood injuries. Parenting interventions that improve supervision and monitoring, teach parents about risks to safety, and model safe practices can help parents reduce injuries in their children (Kendrick, Barlow, Hampshire, Stewart-Brown, & Polnay, 2008). School programs can help students learn and practice



Unintentional injuries from accidents are the most common cause of death in children and adolescents in the United States. iStock/Steve Debenport

safety skills. At the community level, installing and maintaining safe playground equipment and protected floor surfaces can reduce the injuries that accompany falls. Disadvantaged communities, however, may lack the funding to provide safe play spaces, placing residing children at risk.

Childhood Obesity

Obesity is a serious health problem for children today. Health care professionals determine whether someone's weight is in the healthy range by examining **body mass index (BMI)**, calculated as weight in kilograms divided by height in meters squared (kg/m^2 ; World Health Organization, 2009). **Obesity** is defined as having BMI at or above the 95th percentile for height and age, as indicated by the 2000 Centers for Disease Control and Prevention (CDC) growth charts (Reilly, 2007). More than 17% of school-age children are classified as obese, as shown in Figure 9.4 (Ogden, Carroll, Fryar, & Flegal, 2015).

Rising rates of overweight and obesity among children and adolescents are a problem not only in the United States but also in all other developed nations, including Australia, Canada, Denmark, Finland, Germany, Great Britain, Ireland, Japan, Hong Kong, and New Zealand (de Onis, Blössner, & Borghi, 2010; Janssen et al., 2005; Lobstein et al., 2015; Wang & Lim, 2012). Obesity is also becoming more common

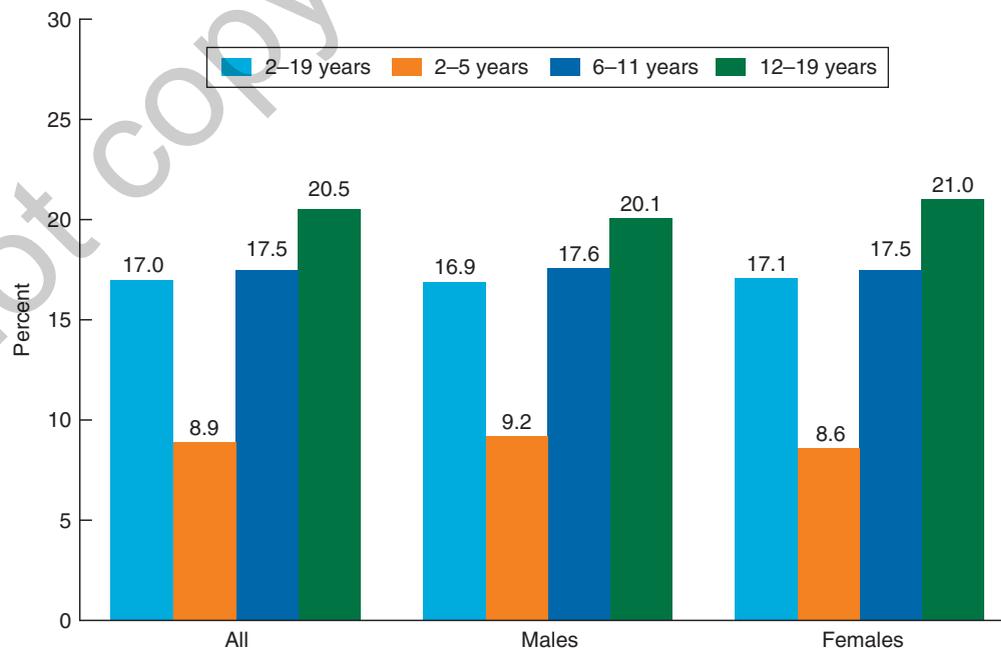
in developing nations, such as India, Pakistan, and China, as they adopt Western-style diets higher in meats, fats, and refined foods and as they show the increased snacking and decreased physical activity linked with watching television (Afshin, Reitsma, & Murray, 2017).

Heredity plays a strong role in obesity, but contextual factors also place individuals at risk for obesity and interact with biology to determine whether genetic predispositions to weight gain are fulfilled (Albuquerque, Nóbrega, Manco, & Padez, 2017; Goodarzi, 2018). For example, children in low SES homes are at higher risk for obesity than their peers who live in high SES homes (Chung et al., 2016). The effects of SES may interact with individuals' genetic predispositions. For example, in one study, children who were carriers of a particular allele of the *OXTR* gene had greater BMI when reared in low SES environments but had the lowest BMI when reared in high SES homes (Bush et al., 2017). Community-level influences on obesity include the lack of safe playgrounds with equipment that encourages activity and even the proximity of fast-food restaurants to schools (Alviola, Nayga, Thomsen, Danforth, & Smartt, 2014; Black, Menzel, & Bungum, 2015; Fan & Jin, 2014).

U.S. children who eat an evening meal with parents are less likely to be overweight than other children (Horning et al., 2017) and are less likely to be overweight as young adults (Berge et al., 2015). These

FIGURE 9.4

Prevalence of Obesity Among Youth Aged 2 to 19 Years, by Sex and Age: United States, 2011–2014



Source: Ogden et al., 2015.

children tend to have more healthy diets that include more fruits and vegetables and less fried foods and soft drinks. The frequency of family dinnertimes drops sharply between ages 9 and 14, however, and family dinners have become less common in recent decades (Fink, Racine, Mueffelman, Dean, & Herman-Smith, 2014). Screen time—time spent in front of a television, computer, or electronic device screen—is a sedentary activity that places children at risk for obesity (Mitchell, Rodriguez, Schmitz, & Audrain-McGovern, 2013). Screen time increases with age (Rideout, 2013). Conversely, screen time and media consumption, especially exposure to media

depictions of unrealistically thin celebrities, predict **body image dissatisfaction**—dissatisfaction with one’s physical appearance as shown by a discrepancy between one’s ideal body figure and actual body figure (Slater & Tiggemann, 2016). Body image dissatisfaction can be seen as early as the preschool years and rises over the course of childhood. This is discussed in the Lives in Context box, Body Image Dissatisfaction.

Child and adolescent obesity is associated with short- and long-term health problems, including heart disease, high blood pressure, orthopedic problems, and diabetes (Pulgarón, 2013). Obese children and

LIVES IN CONTEXT



Body Image Dissatisfaction



Body image dissatisfaction is often first seen in girls during middle childhood.

Peter Dazeley/Getty

"See how my stomach sticks out?" asked Amanda. "I have to wear baggy tops to hide it. I want to wear cropped tops like that one," Amanda said, pointing to a page in a magazine. "But I'm too fat." "Me too," said her best friend, Betsy. At 9 years of age, Amanda and Betsy display signs of body image dissatisfaction.

Up to half of elementary schoolchildren (6–12 years) are dissatisfied with some aspect of their body and shape (Dion et al., 2016; Smolak, 2011).

Perhaps it is not surprising, then, that dieting behaviors often begin in childhood, and about half of 8- to 10-year-old children report dieting at least some of the time (Dohnt & Tiggemann, 2005). Body image dissatisfaction is associated with poor self-esteem, depression, unhealthy eating and exercise behaviors, and inadequate weight gain in childhood (Dion et al., 2016; Duchin et al., 2015). Although less well researched, boys also are vulnerable to body dissatisfaction, often desiring a taller and more muscular physique (Costa, Silva, Alvarenga, & de Assis Guedes de Vasconcelos, 2016).

Peer interactions play a role in body image dissatisfaction. Girls often bond over "fat talk," criticizing their bodies (McVey, Levine, Piran, & Ferguson, 2013). Many school-age girls believe that being thin would make them more likable by their peers and less likely to be teased (Michael et al., 2014). Girls with a higher BMI report experiencing more teasing and bullying, which in turn is associated with body dissatisfaction (McVey et al., 2013; Williams et al., 2013). Even without being teased, simply having a higher BMI relative to peers predicts present body image concerns and those 1 year later in 9- to 12-year-old girls (L. Clark & Tiggemann, 2008).

Individuals' perceptions of body ideals and their own bodies are influenced by multiple contextual factors. Exposure to media images of thin models has often been associated with dieting awareness, weight concerns, and body dissatisfaction in girls and women (E. H. Evans, Tovée, Boothroyd, & Drewett, 2013; Gattario, Frisén, & Anderson-Fye, 2014). The influence of the media is perhaps best illustrated by longitudinal studies of teenagers in the Pacific island nation of Fiji before and after television became widely available in the islands. Disordered eating attitudes and behaviors arose after the introduction of television (Dasen, 1994). With the emergence

of U.S. television programming, girls from rural Fiji reported comparing their bodies unfavorably to those of the program characters (Becker, Keel, Anderson-Fye, & Thomas, 2004).

School-based programs aim to educate students about body image using strategies such as lessons, group discussions, and role play as well as encouraging supportive peer groups (McCabe, Connaughton, Tatangelo, Mellor, & Busija, 2017; O'Dea & Yager, 2011). Improving media literacy is an important focus of many programs. The programs may include lessons about advertising, the homogeneity of body shapes shown on television and magazines, and the airbrushing of photos (Richardson, Paxton, & Thomson, 2009). For example,

as part of a 2011 governmental initiative in British schools, Britney Spears allowed pre-airbrushed images of herself in a bikini to be shown alongside the airbrushed ones for children aged 10 to 11 to show how media might try to alter and improve images (Gattario et al., 2014). Effective programs emphasize providing children with alternative ways of thinking about beauty and body ideals (Gattario et al., 2014).

What Do You Think?

Would you expect boys and girls to react to body image dissatisfaction in similar ways? Why or why not? ●

adolescents are at risk for peer rejection, depression, low self-esteem, and body dissatisfaction (Harrist et al., 2016; Pulgarón, 2013; Quek, Tam, Zhang, & Ho, 2017). The majority of obese youngsters do not outgrow obesity but instead become obese adults (Simmonds, 2016).

Physical activity affects body weight, and it tends to decline beginning in middle childhood, about age 7 (Farooq et al., 2018). It is estimated that only about 10% of 12- to 15-year-olds are at least moderately active for 60 minutes per day on at least 5 days per week, in accord with recommended guidelines (Kann et al., 2014). Programs that effectively reduce obesity in children and adolescents target their screen time and increase their physical activity and time spent outdoors. In addition, successful programs teach

children about nutrition and help them to reduce their consumption of high-calorie foods and increase their consumption of fruits and vegetables (Kumar & Kelly, 2017; Lobstein et al., 2015).

COGNITIVE DEVELOPMENT IN MIDDLE CHILDHOOD

» LO 9.2 Discuss school-age children's capacities for reasoning and processing information.

We have seen that children make impressive gains in physical development, becoming bigger, stronger, and capable of a broader range of motor activities. Their leaps in cognitive development are even more impressive. Children's capacities to take in, process, and retain information all increase dramatically. They grasp the world around them in new, more adultlike ways and become capable of thinking logically, although their reasoning remains different from that of adults. Children become faster, more efficient thinkers, and they develop more sophisticated perspectives on the nature of knowledge and how the mind works.

Piaget's Cognitive-Developmental Theory: Concrete Operational Reasoning

When children enter Piaget's **concrete operational stage of reasoning**, at about age 6 or 7, they become able to use logic to solve problems but are still unable to apply logic to abstract and hypothetical situations. Older children's newly developed ability



THINKING IN CONTEXT 9.1

1. Consider your own physical development and health in childhood and today. How have biological factors contributed to your development? What experiences have influenced you? Consider your context. What factors in the home, school, peer, and neighborhood contexts have influenced your physical development and health?
2. Obesity, body image, and dieting in school-age children reflect the interaction of contextual and developmental factors. If you were to design a prevention or intervention program, what developmental factors would you include? How might you incorporate contextual factors like home, peers, school, neighborhood, and culture into your program?

for logical thinking enables them to reason about physical quantities and is evident in their skills for conservation and classification.

Classification

What hobbies did you enjoy as a child? Did you collect and trade coins, stamps, rocks, or baseball cards? School-age children develop interests and hobbies that require advanced thinking skills, such as the ability to compare multiple items across several dimensions. **Classification** is the ability to understand hierarchies, to simultaneously consider relations between a general category and more specific subcategories. Several types of classification skills emerge during the concrete operational stage: transitive inference, seriation, and class inclusion.

The ability to infer the relationship between two objects by understanding each object's relationship to a third is called **transitive inference**. For example, present a child with three sticks: A, B, and C. She is shown that Stick A is longer than Stick B and Stick B is longer than Stick C. The concrete operational child does not need to physically compare Sticks A and C to know that Stick A is longer than the Stick C. She uses the information given about the two sticks to infer their relative lengths (Wright & Smailes, 2015). Transitive inference emerges earlier than other concrete operational skills. By about 5 years of age, children are able to infer that A is longer than C (Goodwin & Johnson-Laird, 2008).

Seriation is the ability to order objects in a series according to a physical dimension such as height, weight, or color. For example, ask a child to arrange a handful of sticks in order by length, from shortest to longest. Four- to five-year-old children can pick out the smallest and largest stick but will arrange the others haphazardly. Six- to seven-year-old children, on the other hand, arrange the sticks by picking out the smallest, and next smallest, and so on (Inhelder & Piaget, 1964).

Class inclusion involves understanding hierarchical relationships among items. For example, suppose that a child is shown a bunch of flowers, seven daisies and two roses. She is told that there are nine flowers; seven are called daisies and two are called roses. The child is then asked, "Are there more daisies or flowers?" Preoperational children will answer that there are more daisies, as they do not understand that daisies are a subclass of flowers. By age 5, children have some knowledge of classification hierarchies and may grasp that daisies are flowers but still not fully understand and apply classification hierarchies to correctly solve the problem (Deneault & Ricard, 2006). By about age 8, children not only can classify objects, in this case flowers, but also can make quantitative judgments and respond that there

are more flowers than daisies (Borst, Poirel, Pineau, Cassotti, & Houdé, 2013).

Children's ability and interest in hierarchical classification becomes apparent in middle childhood when they begin to collect items and spend hours sorting their collections along various dimensions. For example, one day Susan sorts her rock collection by geographic location (e.g., the part of the world in which it is most commonly found), with subcategories based on hardness and color. She might then reorganize her rocks based on other characteristics, such as age or composition.

Conservation

In a classic conservation problem, a child is shown two identical balls of clay and watches while the experimenter rolls one ball into a long hotdog shape. When asked which piece contains more clay, a child who reasons at the preoperational stage will say that the hotdog shape contains more clay because it is longer. Eight-year-old Julio, in contrast, notices that the ball shape is shorter than the hotdog shape, but it is also thicker. He knows that the two shapes contain the same amount of clay. At the concrete operational stage of reasoning, Julio understands that certain characteristics of an object do not change despite superficial changes to the object's appearance. An understanding of reversibility—that an object can be returned to its original state—means Julio realizes that the hotdog-shaped clay can be reformed into its original ball shape.

Most children solve this conservation problem of substance by age 7 or 8. At about age 9 or 10, children also correctly solve conservation of weight tasks (after presenting two equal-sized balls of clay and rolling one into a hotdog shape, "Which is heavier, the hotdog or the ball?"). Conservation of volume tasks (after placing the hotdog- and ball-shaped clay in glasses of liquid: "Which displaces more liquid?") are solved last, at about age 12. The ability to conserve develops slowly, and children show inconsistencies in their ability to solve different types of conservation problems.

Recent theorists link children's success on conservation tasks with the development of information processing capacities, such as working memory and the ability to control impulses (Borst et al., 2013). In response to conservation of number tasks, for example, older children show more activity in parts of the temporal and prefrontal cortex as well as other parts of the brain associated with working memory, inhibitory control, and executive control (Houdé et al., 2011; Poirel et al., 2012). With practice, the cognitive abilities tested in Piagetian tasks become automatic and require less attention and fewer processing resources, enabling children

to think in more complex ways (Case, 1999). For example, once a child solves a conservation task, the problem becomes routine and requires less attention and mental resources than before, enabling the child to tackle more complex problems.

Culture and Concrete Operational Reasoning

Piaget emphasized the universal nature of cognitive development, assuming that all children around the world progressed through the same stages. Today's researchers, however, find that the cultural context in which children are immersed plays a critical role in development (Goodnow, Lawrence, Goodnow, & Lawrence, 2015). Studies of children in non-Western cultures suggest that they achieve conservation and other concrete operational tasks later than children from Western cultures. However, cultural differences in children's performance on tasks that measure concrete operational reasoning may be influenced by methodology (e.g., how questions are asked and the cultural identity of the experimenter) rather than children's abilities (Gauvain, Perez, Gauvain, & Perez, 2015). For instance, when 10- and 11-year-old Canadian Micmac Indian children were tested in English on conservation problems (substance, weight, and volume), they performed worse than 10- to 11-year-old White English-speaking children. But when tested in their native language, by researchers from their own culture, the children performed as well as the English-speaking children (Collette & Van der Linden, 2002).

Children around the world demonstrate concrete operational reasoning, but experience, specific cultural practices, and education play a role in how it is displayed (Manoach et al., 1997). Children are more likely to display logical reasoning when considering substances with which they are familiar. Mexican children who make pottery understand at an early age that clay remains the same when its shape is changed. They demonstrate conservation of substance earlier than other forms of conservation (Fry & Hale, 1996) and earlier than children who do not make pottery (Hitch, Towse, & Hutton, 2001; Leather & Henry, 1994).

Despite having never attended school and scoring low on measures of mathematics achievement, many 6- to 15-year-old children living in the streets of Brazil demonstrate sophisticated logical and computational reasoning. Why? These children sell items such as fruit and candy to earn their living. In addition to pricing their products, collecting money, making change, and giving discounts, the children must adjust prices daily to account for changes in demand, overhead, and the rate of inflation (Gathercole, Pickering, Ambridge, & Wearing, 2004). Researchers found that these

children's competence in mathematics was influenced by experience, situational demands, and learning from others. Nevertheless, schooling also matters; children with some schooling were more adept at these tasks than were unschooled children (Siegel, 1994).

Schooling influences the rate at which principles are understood. For example, children who have been in school longer tend to do better on transitive inference tasks than same-age children with less schooling (Artman & Cahan, 1993). Likewise, Zimbabwean children's understanding of conservation is influenced by academic experience, age, and family socioeconomic status (Mpofu & Vijver, 2000). Japanese children's understanding of mathematical concepts tends to follow a path consistent with Piaget's maturational view, but other mathematical concepts are understood because of formal instruction, supportive of Vygotsky's principle of scaffolding (see Chapter 7).

School-age children's emerging capacities for reasoning influence their understanding of a variety of phenomena, including their conceptions of illness. We explore this concept more in the accompanying box, Cultural Influences on Development: Children's Understanding of Illness.

Information Processing

"If you're finished, put your head down on your desk and rest for a moment," Mrs. McCalvert advised. She was surprised to see that three quarters of her students immediately put their heads down. "They are getting quicker and quicker," she thought to herself. Information processing theorists would agree with Mrs. McCalvert's observation, because the information processing perspective describes development as entailing changes in the efficiency of cognition rather than qualitative changes in



These school-age children can process and retain information more accurately and quickly than younger children.
iStock/JohnnyGreig

Children's Understanding of Illness



Older children can hold both biological and cultural explanations about the causes of illness.

Reuters/ Ilya Naymushin

Cognitive development influences how children understand biology, their bodies, and the causes of illness. For example, young children tend to attribute contagious illnesses such as colds, coughs, and stomachaches to immanent justice—the belief that illness is caused by misdeeds and naughtiness (Myant & Williams, 2005). Other nonbiological explanations (e.g., magic or fate) are also common. As children advance in cognitive maturity, they develop more mature conceptions of illness, distinguish specific symptoms and diseases, and appreciate the biological causes of illness and contagiousness (Mouratidi, Bonoti, & Leondari, 2016).

Beliefs about biology and the causes of illness may vary by cultural setting. Research has suggested that nonbiological explanations of illness are common in adults from non-Western societies. For example, Murdock (1980) examined evidence from 139 nonindustrial societies around the world and found that most emphasized nonbiological causes of illness. Among the Zande of southern Sudan, for example, illness is thought to be caused by jealous or angry neighbors practicing witchcraft (T. Allen, 2007).

Cultural differences in beliefs about the causes of illness may arise from exposure to different explanations for illness. For example, most children in the United States are exposed to a germ and infection model of illness. Young children show a simple understanding of germs, and older children develop a more elaborate understanding. Children growing up in China have traditionally been exposed to Chinese medicine, which concerns the balance of yin and yang; breaking the balance is thought to lead to illness. In recent decades, however, Chinese children have been increasingly

exposed to Western medicine. With age and the cognitive development that accompanies it, Chinese children tend to integrate these two perspectives, emphasizing biological causes but also referring to concepts from traditional Chinese medicine (Zhu, Liu, & Tardif, 2009).

When exposed to biological concepts of illness, children of all cultures tend to incorporate them into their understanding. For example, one study of 5- to 15-year-old children and adults from Sesotho-speaking South African communities showed that the participants, who were exposed to Western medicine, most commonly endorsed biological explanations for illness but also often endorsed witchcraft (Legare & Gelman, 2008). Both natural and supernatural explanations were viewed as complementary. Likewise, comparisons of older children, adolescents, and adults from Tanna and Vanatu, remote islands off the coast of Malaysia, find that as individuals are confronted with scientific understandings of the world, they integrate scientific explanations with preexisting supernatural and other kinds of natural (e.g., folk-biological) explanations (Watson-Jones, Busch, & Legare, 2015). Tanna and Vanatu children endorsed biological just as frequently as supernatural explanations, but adolescents and adults most commonly endorsed biological explanations.

With age and across cultural groups, when individuals are exposed to biological explanations of illness, such explanations tend to be most frequently endorsed (Legare, Evans, Rosengren, & Harris, 2012). Moreover, the coexistence of biological and nonbiological reasoning about causes of illness is not confined to specific cultures. For example, in the United States and other industrialized societies, many alternative medicine practitioners attribute illness to negative thinking and other psychological problems. U.S. children and adults tend to retain some supernatural explanations alongside biological explanations (Legare et al., 2012). Among people in all cultures, diverse, culturally constructed belief systems about illness coexist with factual understanding and explanations of illness change with development.

What Do You Think?

1. How does our knowledge of individuals' understanding of illness compare with Piaget's cognitive-developmental theory?
2. Consider your own views and experience. Do you remember "catching a cold" when you were a child? What did that mean to you? ●

reasoning. School-age children can take in more information, process it more accurately and quickly, and retain it more effectively than younger children. They are better able to determine what information is important, attend to it, and use their understanding of how memory works to choose among strategies to retain information more effectively.

Working Memory and Executive Function

Children's working memory expands rapidly but is more limited than that of adults. By 8 years of age, children on average recall about half as many items as adults (Kharitonova, Winter, & Sheridan, 2015). Steady increases in working memory and executive function continue throughout childhood and are responsible for the cognitive changes seen during childhood. Advanced executive function capacities enable older children to control their attention and deploy it selectively, focusing on the relevant information and ignoring other information, compared with younger children, who are easily distracted and fidget (Ristic & Enns, 2015). Children not only get better at attending to and manipulating information, but they get better at storing it in long-term memory, organizing it in more sophisticated ways and encoding and retrieving it more efficiently and with less effort.

Improvements in memory, attention, and processing speed are possible because of brain development, particularly myelination and pruning in the prefrontal cortex and corpus callosum (Crone & Steinbeis, 2017; Perone, Almy, & Zelazo, 2018). Between ages 3 and 7, children show increasing prefrontal cortex engagement while completing tasks that measure working memory (Perlman, Huppert, & Luna, 2016). Neural systems for visuospatial working memory, auditory working memory, and response inhibition differentiate into separate parts to enable faster and more efficient processing of these critical cognitive functions (Crone & Steinbeis, 2017; Tsujimoto, Kuwajima, & Sawaguchi, 2007). Older children are quicker at matching pictures and recalling spatial information than younger children, and they show more activity in the frontal regions of the brain compared with younger children (Farber & Beteleva, 2011). Development of the prefrontal cortex leads to advances in response inhibition, the ability to withhold a behavioral response inappropriate in the current context. These advances improve children's capacity for self-regulation, controlling their thoughts and behavior. Advances in working memory and executive function are associated with language, reading, writing, and mathematics skills (Berninger, Abbott, Cook, & Nagy, 2017; Peng et al., 2018).

Age changes in performance on working memory tasks are also influenced by context. For example, the amount of schooling is a better predictor of working memory in Australian school children than chronological age (Roberts et al., 2015). High-quality relations with teachers are associated with higher scores on working memory tasks during elementary school (de Wilde, Koot, & van Lier, 2016).

Metacognition and Metamemory

Whereas young children tend to see the mind as a static container for information, older children view the mind in more sophisticated terms, as an active manipulator of information. Development of the prefrontal cortex influences children's growing capacities for metacognition. Children become mindful of their thinking and better able to consider the requirements of a task, determine how to tackle it, and monitor, evaluate, and adjust their activity to complete the task (Ardila, 2013).

Metamemory, an aspect of metacognition, includes the understanding of one's memory and the ability to use strategies to enhance it. Metamemory improves steadily throughout the elementary school years and contributes to advances in memory (Cottini, Basso, & Palladino, 2018; Schneider & Ornstein, 2015). Kindergarten and first-grade children understand that forgetting occurs with time and studying improves memory, but not until they are age 8 or 9 can children accurately evaluate their knowledge and apply it to learn more effectively. Older children perform better on cognitive tasks because they can evaluate the task; determine how to approach it given their cognitive resources, attention span, motivation, and knowledge; and choose and monitor the use of memory strategies that will permit them to successfully store and retrieve needed information (Schneider & Pressley, 2013). These abilities improve with neural maturation and experience.

Memory Strategies

Advances in executive function, working memory, and attention enable children to use memory strategies—cognitive activities (“tricks”) that make them more likely to remember (Coughlin, Leckey, & Ghetti, 2018). Common memory strategies include rehearsal, organization, and elaboration. **Rehearsal** refers to systematically repeating information in order to retain it in working memory. A child may say a phone number over and over so that he does not forget it before writing it down. Children do not spontaneously and reliably apply rehearsal until after the first grade (Miller, McCulloch, & Jarrold, 2015; Morey, Mareva, Lelonkiewicz, & Chevalier, 2018). Shortly after rehearsal appears, children start

to use **organization**, categorizing or chunking items to remember by grouping it by theme or type, such as animals, flowers, and furniture. When memorizing a list of words, a child might organize them into meaningful groups, or chunks—foods, animals, objects, and so forth. Growth in working memory is partially attributed to an increase in the number of chunks children can retain with age (Cowan et al., 2010). A third strategy, **elaboration**, entails creating an imagined scene or story to link the material to be remembered. To remember to buy bread, milk, and butter, for example, a child might imagine a slice of buttered bread balancing on a glass of milk. It is not until the later school years that children use elaboration without prompting and apply it to a variety of tasks (Schneider & Ornstein, 2015). As metacognition and metamemory skills, and the executive function that underlies these abilities, improve, children get better at choosing, using, and combining memory strategies, and their recall improves dramatically (Stone, Blumberg, Blair, & Cancelli, 2016). For example, fifth-grade students who use more complex memory strategies are more successful in delayed recall tasks in which they are asked to read a passage and then recall it after a delay (Jonsson, Wiklund-Hörnqvist, Nyroos, & Börjesson, 2014).

Context and Cognition

As children go about their daily lives, they acquire increasing amounts of information, which they naturally organize in meaningful ways. As children learn more about a topic, their knowledge structures become more elaborate and organized, while the information becomes more familiar and meaningful. It is easier to recall new information about topics with which we are already familiar, and existing knowledge about a topic makes it easier to learn more about that topic (Ericsson & Moxley, 2013). During middle childhood, children develop vast knowledge bases and organize information into elaborate hierarchical networks that enable them to apply strategies in more complex ways and remember more material than ever before—and more easily than ever before. For example, fourth-grade students who are experts at soccer show better recall of a list of soccer-related items than do students who are soccer novices, although the groups of children do not differ on the non-soccer-related items (Schneider & Bjorklund, 1992). The soccer experts tend to organize the lists of soccer items into categories; their knowledge helps them to organize the soccer-related information with little effort, using fewer resources on organization and permitting the use of more working memory for problem solving and reasoning. Novices, in contrast, lack a knowledge

base to aid their attempts at organization. Children's experiences, then, influence their memory, thinking, and reasoning.

The strategies that children use to tackle cognitive tasks vary with culture. In fact, daily tasks themselves vary with our cultural context. Children in Western cultures receive lots of experience with tasks that require them to recall bits of information, leading them to develop considerable expertise in the use of memory strategies such as rehearsal, organization, and elaboration. In contrast, research shows that people in non-Western cultures with no formal schooling do not use or benefit from instruction in memory strategies such as rehearsal (Rogoff & Chavajay, 1995). Instead, they refine memory skills that are adaptive to their way of life. For example, they may rely on spatial cues for memory, such as when recalling items within a three-dimensional miniature scene. Australian aboriginal and Guatemalan Mayan children perform better at these tasks than do children from Western cultures (Rogoff & Waddell, 1982). Culture and contextual demands influence the cognitive strategies that we learn and prefer, as well as how we use our information processing system to gather, manipulate, and store knowledge. Children of all cultures amass a great deal of information, and as they get older, they organize it in more sophisticated ways and encode and retrieve it more efficiently and with less effort.



THINKING IN CONTEXT 9.2

1. Physical and motor development have clear implications for cognitive development during infancy. Is the same true in middle childhood? In what ways might cognition be influenced by physical and motor development in school-age children?
2. How might your surroundings—culture, neighborhood, home, and school—have influenced specific aspects of your thinking, such as what strategies you use and your capacities for metacognition? Provide an example of how your context influenced your cognitive development.

INTELLIGENCE

» **LO 9.3 Summarize views of intelligence, including the uses, correlates, and criticisms of intelligence tests.**

At its simplest, intelligence refers to an individual's ability to adapt to the world in which he or she lives (Sternberg, 2014). Individuals differ in intelligence, an example of the lifespan concept of individual

differences. There are many ways of defining and measuring intelligence. Intelligence is most commonly assessed through the use of **intelligence tests (IQ tests)**, which measure intellectual aptitude, an individual's capacity to learn.

Intelligence Tests

Individually administered intelligence tests are conducted in a one-on-one setting by professionally trained examiners. The most widely used, individually administered measures of intelligence today are a set of tests constructed by David Wechsler, who viewed intelligence as “the global capacity of a person to act purposefully, to think rationally, and to deal effectively with his environment” (Wechsler, 1944, p. 3). The Wechsler Intelligence Scale for Children (WISC-V), appropriate for children ages 6 through 16, is the most widely used individually administered intelligence test for children. In addition to the



Intelligence tests are often administered individually, one-on-one.
BSIP/Universal/Getty

WISC, there are Wechsler tests for preschoolers (the Wechsler Preschool and Primary Scale of Intelligence, or WPPSI) and adults (the Wechsler Adult Intelligence Scale, or WAIS).

The WISC-V is composed of 10 subtests that comprise an overall measure of IQ as well as five indexes: verbal comprehension, visual spatial, fluid reasoning, working memory, and processing speed (Wechsler, 2014). The WISC tests verbal abilities that tap vocabulary and knowledge and factual information that is influenced by culture. It also tests nonverbal abilities, such as tasks that require the child to arrange materials such as blocks and pictures, that are thought to be less influenced by culture. The nonverbal subtests require little language proficiency, which enables children with speech disorders and those who do not speak English to be fairly assessed. Supplemental subtests are included to aid examiners in further assessing a child's capacities in a given area. Table 9.1 presents the subtests and sample items that comprise the WISC-V. By carefully examining a child's pattern of subtest scores, a professional can determine whether a child has specific learning needs, whether gifted or challenged (Flanagan & Alfonso, 2017).

The WISC is standardized on samples of children who are geographically and ethnically representative of the total population of the United States, creating norms that permit comparisons among children who are similar in age and ethnic background (Sattler, 2014). In Canada, an adapted WISC, standardized with children representative of the Canadian population, is available in English and French (Wechsler, 2014). The WISC has been adapted and used in many other countries, including the United Kingdom, Greece, Japan, Taiwan, Sweden, Lithuania, Slovenia, Germany, Austria, Switzerland,

TABLE 9.1

Sample Items From the Five Wechsler Intelligence Scale for Children (WISC-V)

WISC-V INDEX	SAMPLE ITEM
Verbal Comprehension Index (VCI)	Vocabulary: What does <i>amphibian</i> mean?
Visual Spatial Index (VSI)	Block design: In this timed task, children are shown a design composed of red-and-white blocks, are given a set of blocks, and are asked to put together the block in order to copy the design.
Fluid Reasoning Index (FRI)	Matrix reasoning: Children are shown an array of pictures with one missing. They must select the picture that completes the array.
Working Memory Index (WMI)	Digit span: Children are read lists of numbers and asked to repeat them as heard or in reverse order.
Processing Speed Index (PSI)	Coding: In this timed task, children are shown a code that converts numbers into symbols and are asked to transcribe lists of numbers into code.

France, and the Netherlands (Georgas, Weiss, van de Vijver, & Saklofske, 2003).

IQ scores are a strong predictor of academic achievement. Children with high IQs tend to earn higher-than-average grades at school and are more likely to stay in school (Mackintosh, 2011). School, in turn, provides children with exposure to information and ways of thinking that are valued by the majority culture and reflected in IQ tests. Same-age children with more years of schooling tend to have higher IQs than their less educated peers (Cliffordson & Gustafsson, 2008), and correlations between IQ and school achievement tests tend to increase with age (Sternberg, Grigorenko, & Bundy, 2001), suggesting that schooling is also an influence on IQ.

Individual and Group Differences in IQ

A consistent and controversial finding in the intelligence literature is that African American children as a group tend to score 10 to 15 points below non-Hispanic White Americans on standardized IQ tests (Rindermann & Thompson, 2013). The IQ scores of Hispanic children as a group tend to fall between those of children of African American and non-Hispanic White descent, and the scores of Asian American children tend to fall at the same level or slightly higher than those of non-Hispanic White children (Neisser et al., 1996; Nisbett et al., 2013). It is important to remember, however, that emphasizing differences between groups overlooks important facts. For one thing, individuals of all races and ethnicities show a wide range of functioning, from severely disabled to exceptionally gifted. In addition, the IQ scores of children of all races and ethnicities overlap. For example, at least 20% of African American children score higher on IQ than all other children, whether African American or non-Hispanic White (Rindermann & Thompson, 2013). Because there are more differences among African American children and among non-Hispanic White children than between the two groups, many researchers conclude that group comparisons are meaningless (Daley & Onwuegbuzie, 2011).

Contextual Influences on IQ

Like all facets of development, intelligence is influenced by dynamic interactions among genetic or biological factors and context. Heredity is thought to play a role in intelligence, but to date, researchers have not identified any specific genes that are responsible for IQ (Franić et al., 2015). Genes likely do not act independently but instead in conjunction with the environment (Dubois et al., 2012; Plomin,

DeFries, Knopik, & Neiderhiser, 2016). Perhaps most telling is that the heritability of IQ tends to vary with context.

Genes appear to play a large role in determining IQ scores of children from high SES homes but play less of a role in determining IQ scores for children in low SES homes (Nisbett et al., 2013). Because high SES homes tend to provide consistent support, such as cognitive stimulation, to help children achieve their genetic potential, differences in IQ among children reared in high SES homes are more likely due to genetics. Children from impoverished homes, however, often lack consistent access to the basic support needed for intellectual development, such as nutrition, health care, and stimulating environments and activities. In these cases, IQ scores are often heavily influenced by the context and opportunities that children have experienced (Nisbett et al., 2013). African American children are disproportionately likely to live in poverty, and impoverished children's IQ scores tend to be more influenced by the disadvantaged contexts in which they are immersed than by the genes with which they are born. Likewise, children who are adopted from low SES homes into higher SES homes typically score 12 points or higher on IQ tests than siblings who are raised by birth parents or adopted into lower SES homes (Duyme, Dumaret, & Tomkiewicz, 1999).

Socioeconomic status contributes to IQ through differences in culture, nutrition, living conditions, school resources, intellectual stimulation, and life circumstances such as the experience of discrimination. Any or all of these factors can influence cognitive and psychosocial factors related to IQ, such as motivation, self-concept, and academic achievement (Plomin & Deary, 2015). Education plays a particularly important role in IQ. As noted earlier, school provides children with exposure to information and ways of thinking that are valued by the majority culture and reflected in IQ tests. IQ rises with each year spent in school, improves during the school year—which runs from October to April in the United States—and drops over the summer vacation (Huttenlocher, Levine, & Vevea, 1998). The seasonal drop in IQ scores each summer is larger for children from low SES homes (Nisbett et al., 2013).

Some experts argue that IQ tests tap the thinking style and language of the majority culture (Heath, 1989; Helms, 1992). Language difficulties also may explain some group differences. For example, Latino and Native American children tend to do better on nonverbal tasks than ones that require the use of language (Neisser et al., 1996). However, even nonverbal sorting tasks can be influenced by culture. When presented with a series of cards depicting objects and activities and told to

sort the cards into meaningful categories, children from Western cultures tend to sort the cards by category, putting bird and dog in the same category of animal. Children of the Kpelle tribe in Nigeria instead sort the cards by function, placing bird with fly, for example, because birds fly (Sternberg, 1985). Learning experiences and opportunities influence children's scores on nonverbal tasks. For example, performance on spatial reasoning tasks is associated with experience with spatially oriented video games (Subrahmanyam & Greenfield, 1996).

Finally, sociohistorical context influences intelligence. Since the 1930s, some researchers have noted that intelligence scores increase with each generation (Lynn, 2013). Over the past 60 years, intelligence scores have increased by about 9 points for measures of general knowledge and 15 points for nonverbal measures of fluid reasoning with each generation (Flynn, 1987, 1998). Referred to as the **Flynn effect**, this generational increase in IQ is thought to be a function of contextual factors—specifically, changes in education and environmental stimulation that improve children's reasoning and problem-solving skills (Flynn & Weiss, 2007). Each generation of children is exposed to more information and ideas than the generation before, and this exposure likely influences thinking itself (te Nijenhuis, 2013).

Alternative Views of Intelligence

Arguments about the cultural bias of IQ tests have led some researchers to reconsider what it means to be intelligent. Howard Gardner and Robert Sternberg propose that intelligence entails more than academics. Their theories link intelligence to everyday problems and situations.

Multiple Intelligences

A skilled dancer, a champion athlete, an award-winning musician, and an excellent communicator all have talents that are not measured by traditional IQ tests. According to Howard Gardner (2017), intelligence is the ability to solve problems or create culturally valued products. Specifically, Gardner's **multiple intelligence theory** proposes at least eight independent kinds of intelligence, shown in Table 9.2. Multiple intelligence theory expands the use of the term *intelligence* to refer to skills not usually considered intelligence by experts and has led to a great deal of debate among intelligence theorists and researchers (Kaufman, Kaufman, & Plucker, 2013).

According to multiple intelligence theory, each person has a unique pattern of intellectual strengths and weaknesses. A person may be gifted in dance (bodily-kinesthetic intelligence), communication (verbal-linguistic intelligence), or music (musical intelligence), yet score low on traditional measures of IQ. Each form of intelligence is thought to be biologically based, and each develops on a different timetable (Gardner, 2017). Assessing multiple intelligences requires observing the products of each form of intelligence (e.g., how well a child can learn a tune, navigate an unfamiliar area, or learn dance steps), which at best is a lengthy proposition and at worst is nearly impossible (Barnett, Ceci, & Williams, 2006). However, through extended observations, an examiner can identify patterns of strengths and weaknesses in individuals and help them understand and achieve their potential (Gardner, 2016).

The theory of multiple intelligences is an optimistic perspective that allows everyone to be intelligent in his or her own way, viewing intelligence as broader than book-learning and academic skills.

TABLE 9.2

Multiple Intelligences

INTELLIGENCE	DESCRIPTION
Verbal-linguistic intelligence	Ability to understand and use the meanings and subtleties of words (“word smarts”)
Logical-mathematical intelligence	Ability to manipulate logic and numbers to solve problems (“number smarts”)
Spatial intelligence	Ability to perceive the visual-spatial world accurately, navigate an environment, and judge spatial relationships (“spatial smarts”)
Bodily-kinesthetic intelligence	Ability to move the body skillfully (“body smarts”)
Musical intelligence	Ability to perceive and create patterns of pitch and melody (“music smarts”)
Interpersonal intelligence	Ability to understand and communicate with others (“people smarts”)
Intrapersonal intelligence	Ability to understand the self and regulate emotions (“self-smarts”)
Naturalist intelligence	Ability to distinguish and classify elements of nature: animals, minerals, and plants (“nature smarts”)

Source: Gardner, 2017.

If intelligence is multidimensional, as Gardner suggests, perhaps school curricula should target the many forms that intelligence may take and help students to develop a range of talents (Gardner, 2013). Although the theory of multiple intelligences has been criticized as not being grounded in research (Waterhouse, 2006), neuroscientists have noted that each type of intelligence corresponds to specific neurological processes (Shearer & Karanian, 2017). The theory of multiple intelligences draws attention to the fact that IQ tests measure a specific set of mental abilities and ignore others.

Triarchic Theory of Intelligence

Jason Bourne, hero of the popular spy-action novel and movie series *The Bourne Trilogy*, is highly adaptive. He can quickly gather information, such as a villain's plot, process it, and devise a plan. He adapts his plan on the fly as the situation changes and thinks creatively in order to escape seemingly impossible situations—traps, car chases, and other dangerous scenarios. Certainly Jason Bourne is a fictional character, but he illustrates another view of intelligence, articulated by Robert Sternberg. According to Sternberg (1985), intelligence is a set of mental abilities that permits individuals to adapt to any context and to select and modify the sociocultural contexts in which they live and behave. Sternberg's **triarchic theory of intelligence** poses three forms of intelligence: analytical, creative, and practical (Sternberg, 2011) (see Figure 9.5). Individuals may have strengths in any or all of them.

Analytical intelligence refers to information processing capacities, such as how efficiently people acquire knowledge, process information, engage in metacognition, and generate and apply strategies to solve problems—much like Bourne's ability to process information quickly and consider different solutions. *Creative intelligence* taps insight and the ability to deal with novelty. People who are high in

creative intelligence, like Bourne, respond to new tasks quickly and efficiently. They learn easily, compare information with what is already known, come up with new ways of organizing information, and display original thinking. *Applied intelligence* influences how people deal with their surroundings: how well they evaluate their environment, selecting and modifying it, and adapting it to fit their own needs and external demands—similar to Bourne's ability to modify his plans on the fly, using whatever resources are available. Intelligent people apply their analytical, creative, and applied abilities to suit the setting and problems at hand (Sternberg, 2011). Some situations require careful analysis, others the ability to think creatively, and yet others the ability to solve problems quickly in everyday settings. Many situations tap more than one form of intelligence.

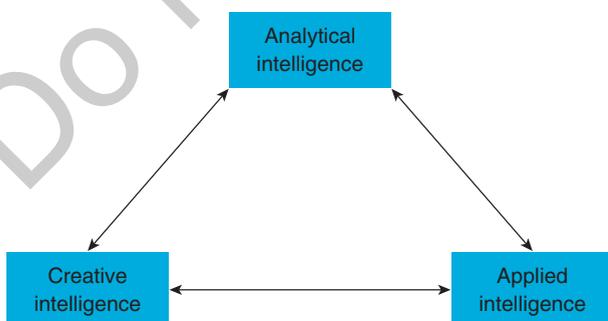
Traditional IQ tests measure analytical ability, which is thought to be associated with school success. However, IQ tests do not measure creative and practical intelligence, which predict success outside of school. Some people are successful in everyday settings but less so in school settings and therefore may obtain low scores on traditional IQ tests despite being successful in their careers and personal lives. In this way, traditional IQ tests can underestimate the intellectual strengths of some children.

Cultures vary in the specific skills thought to constitute intelligence, but the three mental abilities that underlie intelligent behavior—analytic, creative, and applied intelligence—are recognized across cultures. Still, the relative importance ascribed to each may differ (Sternberg & Grigorenko, 2008). In Western cultures, the intelligent person is one who invests a great deal of effort into learning, enjoys it, and enthusiastically seeks opportunities for lifelong learning. In contrast, other cultures emphasize applied intelligence. For example, the Chinese Taoist tradition emphasizes the importance of humility, freedom from conventional standards of judgment, and awareness of the self and the outside world (Yang & Sternberg, 1997). In many African cultures, conceptions of intelligence revolve around the skills that maintain harmonious interpersonal relations (Ruzgis & Grigorenko, 1994). Chewa adults in Zambia emphasize social responsibilities, cooperativeness, obedience, and respectfulness as being important to intelligence. Likewise, Kenyan parents emphasize responsible participation in family and social life (Serpell, 1974; Serpell & Jere-Folotiya, 2008; Super & Harkness, 1982).

Views of intelligence even vary within a given context (Sternberg, 2014). For example, when parents were asked of the characteristics of an intelligent child in the first grade of elementary school, White American parents emphasized cognitive capacities. Parents who were immigrants from Cambodia, the Philippines, Vietnam, and Mexico, on the other hand,

FIGURE 9.5

Triarchic Theory of Intelligence



pointed to motivation, self-management, and social skills (Okagaki & Sternberg, 1993), suggesting that characteristics valued as intelligent vary across cultures and that children within the same context may be immersed in different cultures (Sternberg, 2014). Once again, we see the complexity of context and culture as influences on development.



THINKING IN CONTEXT 9.3

1. How do you define intelligence? From your perspective, what has influenced your own intelligence, as you have defined it? How does your view compare with the views that we have discussed?
2. How might definitions and views of intelligence differ across contexts—different socioeconomic levels, different neighborhoods, or different cultures, such as Western and non-Western?

MORAL DEVELOPMENT IN MIDDLE CHILDHOOD

» LO 9.4 Examine patterns of moral development during middle childhood.

The development of moral reasoning is influenced by childhood advances in cognitive development, social experience, and opportunities to consider issues of fairness. Specifically, children's reasoning about justice changes in middle childhood.

Moral Reasoning: Piaget's Theory

As elementary school children spend more time with peers and become better at taking their friends' perspectives, their understanding of rules becomes more flexible. Recall from Chapter 7 that according to Piaget (1932), young children view rules rigidly. Piaget referred to this stage as heteronomous morality. In middle childhood, at about age 7, children enter the second stage of Piaget's scheme, **autonomous morality** (also known as the *morality of cooperation*). Now children begin to see rules as products of group agreement and tools to improve cooperation. For example, older children are likely to recognize that the teacher's rule that the youngest children must be the first to bat at the piñata at a children's party is a way to help the youngest children, who are less likely to be successful. Some children might agree that the rule promotes fairness, while others might argue to abandon the rule as it gives younger children an unfair advantage. At this

stage, children view a need for agreement on rules and consequences for violations. Piaget's theory of moral reasoning inspired Lawrence Kohlberg, who created perhaps the most well-known theory of moral reasoning.

Children's Conceptions of Justice: Kohlberg's Cognitive-Developmental Perspective

Kohlberg (1976) proposed that moral reasoning reflects cognitive development and is organized into stages and levels. Each level of moral reasoning is composed of two stages. Beginning in early childhood and persisting until about age 9, children demonstrate what Kohlberg called pre-conventional reasoning. Similar to Piaget, Kohlberg argued that young children's behavior is governed by self-interest, the desire to gain rewards and avoid punishments ("Don't steal because you don't want to go to jail"). Moral behavior is a response to external pressure, and children's reasoning illustrates their difficulty in taking another person's perspective. Instead, young children's moral reasoning is motivated by their desires. The pre-conventional level comprises two stages, in which children move from avoiding punishment as a motivator of moral judgments (Stage 1) to self-interest, rewards, and concern about what others can do for them (Stage 2).

At about age 9 or 10, children transition to the second level of Kohlberg's scheme, **conventional moral reasoning**. Children are now able to take others' perspectives and are motivated by reciprocity, seeking to be accepted and avoid disapproval. Rules maintain relationships. At Stage 3, children uphold rules in order to please others, gain affection, and be a good person—honest, caring, and nice. The Golden Rule motivates their behavior: "Do unto others as you would have them do unto you." At Stage 4, which emerges in adolescence, perspective taking expands beyond individuals to include society's rules. Adolescents accept rules as a tool to maintain social order and believe that everyone has a duty to uphold the rules. Reasoning is no longer influenced by relationships and a desire to be a good person. Instead, rules are universal and must be enforced for everyone. Many people demonstrate conventional reasoning throughout their lives. Not everyone develops the third and final level of reasoning, post-conventional reasoning, discussed in Chapter 11. Pre-conventional and conventional moral reasoning are compared in Table 9.3.

Moral development is influenced by how parents and caregivers discuss moral issues, such as those involving telling the truth, harming others, and respecting property rights (Malti & Latzko,

TABLE 9.3

Moral Development in Middle Childhood: Comparison of Piaget and Kohlberg's Theories

	PIAGET'S STAGES		KOHLBERG'S LEVELS ^a	
	STAGE 1: MORALITY OF CONSTRAINT	STAGE 2: MORALITY OF COOPERATION	LEVEL 1: PRECONVENTIONAL MORAL REASONING	LEVEL 2: CONVENTIONAL MORAL REASONING
Cognitive-developmental stage	Preoperational	Concrete operational	Preoperational	Concrete operational
Perspective	Individualistic. Children cannot take the perspective of others; they assume that everyone sees the world as they do.	Multiple. Children can take the perspective of others; they see that more than one point of view is possible and that others do not necessarily view issues as they do.	Individualistic. Children cannot take the perspective of others; they focus on their own needs.	Community. Children take the perspective of the community at large; there is an emphasis on societal rules and welfare.
View of justice	Absolute. Children see acts as either right or wrong, with no shades of gray. The wrongness of an act is defined by punishment.	Relative. Children see that there is often more than one point of view. Acts are seen as right or wrong regardless of punishment.	Absolute. Acts are either right or wrong, defined by punishment and rewards.	Absolute. Right or wrong acts are defined by social approval.
Understanding of rules	Rules are unalterable and sacred.	Rules are created by people and can be changed if it suits people's needs.	Rules are unalterable and imposed by authority figures.	Rules are unalterable and act to uphold the community.
Reason for compliance with rules	Rules are obeyed out of a sense of obligation to conform to authority and to avoid punishment.	Rules perceived as just are obeyed for their own sake rather than under threat of punishment.	Rules are followed in order to gain rewards and avoid punishment.	Rules are followed out of a sense of duty, in order to please others and gain social approval, which is more important than other rewards.

Sources: Adapted from Hoffman (1970); Kohlberg (1981); Piaget (1932).

^aEach level comprises two stages. Level 3, Postconventional Moral Reasoning, is discussed in Chapter 11.

2010). Reasoning advances when children have opportunities to engage in discussions that are characterized by mutual perspective taking and opportunities to discuss different points of view. When children encounter reasoning that is slightly more advanced than their own, they may be prompted to reconsider their own thinking and advance their reasoning. Parents who are warm and engage their children in discussion, listen with sensitivity, and use humor promote the development of moral reasoning (Carlo, Mestre, Samper, Tur, & Armenta, 2011; Killen & Smetana, 2015).

Distributive Justice Reasoning

Every day, children are confronted with moral issues of distributive justice—how to divide goods fairly (Damon, 1977, 1988). For example, how should a candy bar be divided among three siblings? Does

age matter? Height? Hunger? How much the child likes chocolate?

As with moral reasoning, children progress from self-serving reasons for sharing, expressed in early childhood (e.g., “I get more candy because I want it” or “I share candy so that Mikey will play with me”), to more sophisticated and mature conceptions of distributive justice in middle childhood (Damon, 1977). At about 7 years of age, children take merit into account and believe that extra candy should go to the child who has excelled or worked especially hard. At around 8 years of age, children can act on the basis of benevolence, believing that others at a disadvantage should get special consideration. For example, extra candy should go to the child who does not get picked to play on a sports team or a child who is excluded from an activity. Between ages 8 and 10, children come to understand that people can have different yet equally valid reasons for claiming a

reward. They begin to reflect on the need to balance competing claims, such as those of merit and need (Smith & Warneken, 2016). Older children also tend to differentiate among their relationships, which may influence their judgments. For example, older children often see relationships with acquaintances as relationships of mutual exchange (e.g., you scratch my back and I'll scratch yours), whereas relationships with their best friends might be seen as communal and reciprocal; decisions may be guided by concern for the other and a desire to maintain the relationship (Frederickson & Simmonds, 2008). Preadolescents and young adolescents try to coordinate claims of merit, need, and equality and provide increasingly sophisticated answers that often cannot be expressed in a single sentence (Damon, 1980).

Culture subtly influences children's ideas about distributive justice. Research with young children from rural and urban areas of China, Peru, Fiji, United States, Brazil, and Tibet showed a similar pattern of development from self-interest to increasing fairness (Robbins, Starr, & Rochat, 2016; Rochat et al., 2009). Cultures varied in the magnitude of young children's self-interest. Children reared in small-scale urban and traditional societies thought to promote more collective values showed less self-interest and more fairness. When Filipino and American fifth graders were presented with hypothetical scenarios that required that they distribute resources, both the Filipino and American children preferred equal division of the resources regardless of merit or need, but the children offered different explanations of their choices that are based in differences in Filipino and U.S. culture (Carson & Banuazizi, 2008). U.S. children emphasized that the characters in the scenario preformed equally and therefore deserved equal amounts of the resources, reflecting U.S. culture's emphasis on individuality and merit. Filipino children, on the other hand, tended to be more concerned with the interpersonal and emotional consequences of an unequal distribution, in line with their culture's emphasis on the collective and the importance of interpersonal relationships (Carson & Banuazizi, 2008).

Distinguishing Moral and Conventional Rules

Like younger children, school-age children distinguish between moral and conventional rules, judging moral rules as more absolute than conventional rules (see Chapter 7) (Turiel & Nucci, 2017). Moral rules are seen as less violable, less contingent on authority, and less alterable than social conventions (Smetana, Jambon, & Ball, 2014). Children anticipate feeling positive emotions after following moral rules and are likely to label violations



As children grow older they are more likely to view relational aggression as morally wrong and comparable to physical aggression.

iStock/LSOphoto

of moral rules as disgusting (Danovitch & Bloom, 2009). With advances in cognitive development, children can consider multiple perspectives and become better able to consider the situation and weigh a variety of variables in making decisions. They discriminate social conventions that have a purpose from those with no obvious purpose. Social conventions that serve a purpose, such as preventing injuries (e.g., not running indoors), are evaluated as more important and more similar to moral issues than social conventions with no obvious purpose (e.g., avoiding a section of the school yard despite no apparent danger) (Smetana et al., 2014). School-age children also consider intent and context. For example, Canadian 8- to 10-year-old children understood that a flag serves as a powerful symbol of a country and its values—and that burning it purposefully is worse than accidentally burning it. The 10-year-old children also understood that flag burning is an example of freedom of expression and can be used to express disapproval of a country or its activities. They agreed that if a person were in a country that is unjust, burning its flag would be acceptable (Helwig & Prencipe, 1999).

School-age children also distinguish among moral issues. For example, elementary school children judged bullying as wrong independent of rules and more wrong than other moral issues, such as lapses in truth-telling—and both were judged more wrong than etiquette transgressions (Thornberg, Thornberg, Alamaa, & Daud, 2016). School-age children become increasingly able to demonstrate nuanced judgments in response to complex moral dilemmas. For example, 5- to 11-year-old children become increasingly tolerant of necessary harm—that is, violating moral rules in order to prevent injury to others (Jambon & Smetana, 2014).

Children develop and hone their understanding of morality through social interaction, at home, at

BRAIN AND BIOLOGICAL INFLUENCES ON DEVELOPMENT



Moral Development and the Brain

Morality is multidimensional, influenced by cognition as well as by quick intuitive emotional responses (De Neys & Glumicic, 2008; Greene & Haidt, 2002; Haidt, 2008). Moral decisions are frequently described as gut reactions. How is morality represented in the brain?

Most of the research on the neural correlates of morality is conducted with adults. These studies suggest that activity in the frontal cortex, especially the ventromedial prefrontal cortex (vmPFC), is central to making moral decisions (Prehn et al., 2008; Young & Koenigs, 2008). The vmPFC plays a role in planning, responding to decision uncertainty, response inhibition, and directing the emotions that arise while solving moral problems. Increased vmPFC activity is observed in response to deliberating over more severe relative to less severe moral transgressions (Luo et al., 2006). Longitudinal research suggests that the vmPFC increases in thickness from childhood into adolescence, and the thickening is associated with increased capacities for introspection, which has implications for moral reasoning (Fandakova et al., 2017).

In one study, children and adults (ages 4–37) responded to scenarios depicting intentional versus accidental actions that caused harm or damage to people or objects (Decety, Michalska, & Kinzler, 2012). Both children and adults judged intentional harm as wrong. With age, participants showed greater activity in the vmPFC in response to intentional harm to people. They also showed greater connectivity between the vmPFC and

the amygdala, a part of the brain responsible for emotion (Jung et al., 2016), suggesting that, with age, cognitive and emotional processing of moral problems becomes increasingly coordinated. In support, other research has shown that adults who score high on moral reasoning tasks tend to show greater functional connectivity between the vmPFC and the amygdala (Jung et al., 2016). Moreover, connections between the vmPFC and amygdala increase with age (Decety et al., 2012). It is thought that the amygdala triggers automatic emotional responses to stimuli (Everitt, Cardinal, Parkinson, & Robbins, 2003). The vmPFC integrates this information to evaluate the problem and determine responses.

Moral development is complex, and the emotional and cognitive processes that comprise it are influenced by many brain regions that interact. Morality is supported not by a single brain circuitry or structure but by a multiplicity of circuits that overlap with other general complex processes (Decety et al., 2012).

What Do You Think?

1. What might the neurological basis of morality mean for the nature–nurture question?
2. What role do you think context plays in children's moral reasoning?
3. How do you reconcile findings supporting biological and contextual influences on moral development? ●



THINKING IN CONTEXT 9.4

1. Theories of moral reasoning emphasize cognition. In what ways might children's decisions about right and wrong reflect other factors, such as physical maturation or socioemotional development?
2. How might exosystem and macrosystem factors (recall Bronfenbrenner's bioecological model) influence children's views of right and wrong?

school, and with peers. Children regularly encounter moral and conventional issues, such as lying to a friend, not completing homework, or violating a household rule. Everyday social interactions can advance moral reasoning. When children engage in issue-focused discussions involving reasoning that is slightly more advanced than their own, it may

prompt them to reconsider their own thinking. As a result, they often internalize the new reasoning, advancing their moral thinking to a new level. Moral development is also thought to be influenced by brain development, as discussed in the Brain and Biological Influences on Development feature.

LANGUAGE DEVELOPMENT IN MIDDLE CHILDHOOD

» LO 9.5 Summarize language development during middle childhood.

School-age children expand their vocabulary and develop a more complex understanding of grammar, rules that permit combining words to express ideas and feelings. Children's understanding of pragmatics, how language is used in everyday contexts, grows and becomes more sophisticated during middle childhood.

Vocabulary

School-age children's increases in vocabulary are not as noticeable to parents as the changes that occurred in infancy and early childhood. Nevertheless, 6-year-old children's vocabularies expand by four times by the end of the elementary school years and six times by the end of formal schooling (E. V. Clark, 2017).

Children learn that many words can describe a given action, but the words often differ slightly in meaning (e.g., walk, stride, hike, march, tread, strut, and meander) (Hoff, 2014). They become more selective in their use of words, choosing the right word to meet their needs. As their vocabularies grow, children learn that some words can have more than one meaning, such as *run* ("The jogger runs down the street," "The clock runs fast," etc.). They begin to appreciate that some words have psychological meanings as well as physical ones (e.g., a person can be smooth and a surface can be smooth). This understanding that words can be used in more than one way leads 8- to 10-year-old children to understand similes and metaphors (e.g., a person can be described as "cold as ice" or "sharp as a tack") (Katz, 2017).

Everyday experiences shape our vocabulary, how we think, and how we speak. Words are often acquired incidentally from writing and verbal contexts rather than through explicit vocabulary instruction (Owens, 2016). Some complex words, such as scientific terms, require the acquisition of conceptual knowledge over repeated exposure in different contexts. One study examined 4- to 10-year-old children's knowledge of two scientific terms, *eclipse* and *comet*, before and after the natural occurrence of a solar eclipse. Two weeks after the solar eclipse and without additional instruction, the children showed improvement in their knowledge of eclipses but not comets; older and younger children did not differ in their knowledge (Best, Dockrell, & Braisby, 2006).



Children's vocabulary expands and becomes more complex during the school years.
iStock/FangXiaNuo

Grammar

Older children become increasingly aware of and knowledgeable about the nature and qualities of language, known as metalinguistic awareness (Simard & Gutiérrez, 2018). Language arts classes in elementary school teach children about the parts of language and the syntax of sentences, aiding children as they further develop their ability to think about their use of language.

By 8 years of age, children can analyze the grammatical acceptability of their utterances and spontaneously self-correct many of their errors (Hanley, Cortis, Budd, & Nozari, 2016).

In middle childhood, schoolchildren become better able to understand complex grammatical structures. They begin to use the passive voice ("The dog is being fed"), complex constructions such as the use of the auxiliary *have* ("I have already fed the dog"), and conditional sentences ("If I had been home earlier, I would have fed the dog") (E. V. Clark, 2017). Despite these advances, school-age children often have difficulty understanding spoken sentences of which the meaning depends on subtle shifts in intonation (Turnbull & Justice, 2016). An example can be found in the sentence, "John gave a lollipop to David, and he gave one to Bob." With the emphasis placed on "and," the sentence can be taken to mean that John gave a lollipop to both David and Bob, whereas if the emphasis is on "he," the sentence can be assumed to mean that John gave a lollipop to David, and David gave a lollipop to Bob.

Experience with language and exposure to complex constructions influence grammatical development. For example, most English-speaking children find passive-voice sentences (such as "The boy was struck by the car") difficult to understand and therefore master passive-voice sentences later than other structures (Armon-Lotem et al., 2016). In contrast, the Inuit children of Arctic Canada hear and speak the Inuktitut language, which emphasizes full passives; they produce passive-voice sentences in their language sooner than do children from other cultures (S. E. M. Allen & Crago, 1996). The culture and language systems in which children are immersed influence their use of language and, ultimately, the ways in which they communicate. Throughout middle childhood, sentence structure and use of grammar become more sophisticated, children become better at communicating their ideas, and their understanding of pragmatics improves.

Pragmatics

Pragmatics refers to the practical application of language to communicate (Owens, 2016). With age and advances in perspective-taking skills that come

with cognitive development, children are more likely to change their speech in response to the needs of listeners. For example, when faced with an adult who will not give them a desired object, 9-year-old children are more polite in restating their request than are 5-year-old children (Ninio, 2014). Similarly, 10-year-old Marques asks to share a cookie with his friend (“Yo! Gimme a cookie!”) using very different language and intonation than he does when asking his grandmother for a cookie (“May I please have a cookie?”). Children speak to adults differently than to other children, and they speak differently on the playground than in class or at home. In addition, older children begin to understand that there is often a distinction between what people say and what they mean.

One example of pragmatics that develops in middle childhood is the use of *irony*, choosing a word or expression that conveys the opposite of its literal meaning. Many contextual, linguistic, and developmental factors influence the processing and comprehension of irony, such as the ability to interpret intonation and facial expressions as well as the capacity to evaluate how well a statement matches the situation (Pexman, 2014). Children at the ages of 5 to 6 become capable of recognizing irony when they are able to understand that a speaker might believe something different from what has been said. Yet most children at this age tend to interpret irony as sincere, relying on the person’s statement and disregarding other cues in the story, such as intonation and gestures. Cognitive development permits children to detect the discrepancy between what the speaker says and what he or she believes. Children’s ability to understand ironic remarks continues to develop through middle childhood, and by age 8, children can recognize and use irony (Glenwright & Pexman, 2010). However, even in adolescence, the understanding of irony is still developing; children as old as 13 do not reliably distinguish irony, intended to joke or mock, from deception, intended to conceal information (Filippova & Astington, 2008).



THINKING IN CONTEXT 9.5

1. Recall from Chapter 1 that development is characterized by continuities and discontinuities. How might you characterize language development? Is it continuous or discontinuous? Why?
2. In what ways does language development illustrate the interaction of developmental and contextual factors? Give some examples related to school-age children’s language development.

LEARNING AND SCHOOLING IN MIDDLE CHILDHOOD

» LO 9.6 Discuss children’s learning at school.

Schoolchildren’s growing cognitive abilities enable them to learn in more sophisticated ways. However, their understanding of logic is concrete, oriented toward the tangible. Effective instruction helps older children grasp complex ideas by identifying connections between new material and prior knowledge, building on what they already know, and keeping pace with their growing abilities. During the school years, older children become proficient at reading, writing, and mathematics.

Reading and Mathematics

Cognitive development, especially advances in executive functioning and working memory, contribute to advances in math achievement and reading comprehension in elementary school (Cormier, McGrew, Bulut, & Funamoto, 2017). Schooling plays a key role in aiding children in mastering reading and math.

In past generations, most children were taught to read via **phonics instruction**, lessons and drills that emphasized learning the patterns of sound combinations in words. Children learned the sounds of each letter, memorized language rules, and sounded out words (Brady, 2011). In the late 1980s, the whole-language approach to reading instruction was introduced. In this approach, literacy is viewed as an extension of language, and children learn to read and write through trial-and-error discovery that is similar to how they learn to speak—without drills or learning phonics. The emphasis on children as active constructors of knowledge is appealing and in line with cognitive-developmental theory. Today, the whole-language approach is still in widespread use, and many teachers are not trained in phonics instruction. However, the research comparing the two approaches has offered little support for whole-language claims and overwhelming support for the efficacy of phonics training in improving children’s reading skills (Cunningham, 2013).

A substantial number of U.S. children are poor readers and thereby at risk for poor academic achievement. In 2015, about one third of fourth-grade students were unable to meet basic standards for reading at their grade level (National Center for Education Statistics, 2017a). Early reading deficits influence all areas of academic competence (math, writing, science, etc.), and children who experience



Advances in cognitive development underlie older children's achievements in math, reading, and other academic skills.
iStock/Choreograph

early difficulties in reading often remain behind (Hong & Yu, 2007). Children's attitudes, interests, and motivation in reading and writing tend to decline over the school years, and the drop occurs more rapidly in worse readers (Wigfield, Gladstone, & Turci, 2016). Deficits in reading skill are associated with social adjustment problems, and this association increases over time. For example, poor reading achievement in preschool and third grade predicts behavioral problems in first grade and fifth grade (Guo, Sun, Breit-Smith, Morrison, & Connor, 2015). Children with poor reading skills tend to have poor vocabularies, which may make it more difficult for them to successfully interact with peers (Benner, Nelson, & Epstein, 2002).

Similar to reading, in past generations, math was taught through rote learning activities such as drills, memorization of number facts (e.g., multiplication tables), and completion of workbooks. Many children found these methods boring or restrictive; they learned to dislike math and did not perform well. In 1989, the National Council of Teachers of Mathematics modified the national mathematics curriculum to emphasize mathematical concepts and problem solving, estimating, and probability; teachers were to encourage student interaction and social involvement in solving math problems. The emphasis changed from product—getting correct answers quickly—to process—learning how to understand and execute the steps in getting an answer. Teachers often use strategies that involve manipulatives, opportunities for students to interact physically with objects to learn target information, rather than relying solely on abstraction. Such strategies have been shown to be effective in enhancing problem solving and retention (Carbonneau, Marley, & Selig, 2013).

In contrast with research findings about the whole-language approach to reading, changes in the mathematics curriculum are supported by

student achievement, as fourth-grade students' mathematical skills have improved over the past two decades. Between 1990 and 2015, the proportion of fourth-grade students performing at or above the proficient level increased from 13% to 40%, and the proportion that could not do math at their grade level fell from 50% in 1990 to 18% in 2015 (National Center for Education Statistics, 2017a). Although these represent important gains, the 18% statistic means that nearly one in five U.S. schoolchildren is still deficient in math skills, suggesting that there is more work to be done. The past decade has seen new educational initiatives that emphasize math and reading instruction coupled with frequent assessments of student achievement to ensure that progress is made and children do not fall through the cracks. What should educators do when children fail to meet academic standards for promotion to the next grade level? See the accompanying box, Applying Developmental Science: Grade Retention, for more discussion on this topic.

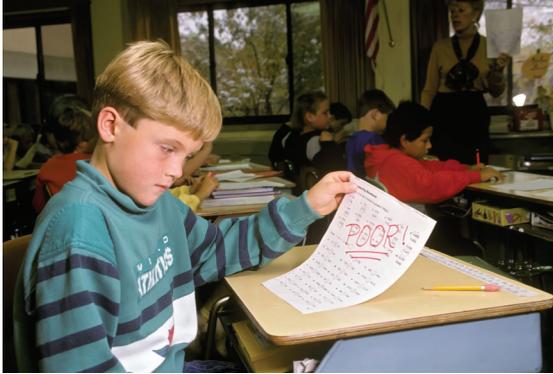
Bilingualism and Learning a Second Language

It is estimated that more than 50% of the world's children are exposed to more than one language (Grosjean, 2010). An estimated 350 languages, including 150 native North American languages, are spoken in U.S. homes (U.S. Bureau of the Census, 2015).

Simultaneous Bilingualism

Children who are exposed to two languages from birth are referred to as simultaneous bilinguals, or bilingual first-language learners (Genesee, 2006). Infants who are exposed to two languages build distinct language systems from birth and by 1 year of age show understanding of the phonetic categories for both languages (MacWhinney, 2015). The rate of acquisition for two languages, like that for one language, depends on the quantity and quality of the input in each language (Hoff & Core, 2015). Because children who are exposed to two languages will tend to hear less of either language than their monolingual peers, their rate of growth in each language tends to be slower than those who are exposed to and acquire a single language. Bilingual children tend to lag behind monolingual children in vocabulary and grammar in each language (Hindman & Wasik, 2015). However, bilingual children's combined vocabularies for both languages tend to be similar in size to the vocabulary of monolingual children (Bosch & Ramon-Casas, 2014). The gap in language development between monolingual and bilingual children narrows with age, and bilingual children

Grade Retention



Providing students and families with a variety of academic and support resources to promote student achievement may be more effective than the practice of grade retention.

Dennis MacDonald / Alamy Stock Photo

Today, at least 16 U.S. states require students who fall a grade behind in reading achievement to be retained, or "left back" (Jacob, 2016). About 10% of U.S. children are retained in a grade at least once between kindergarten and eighth grade (National Center for Education Statistics, 2017b). In addition to state-mandated retention due to low achievement scores, students are retained for other reasons, such as frequent unexcused absences, social and cognitive immaturity, and the belief that an

extra year of schooling will produce successful academic and socioemotional outcomes. African American and Hispanic students as well as students from poor households are disproportionately likely to be retained compared with European American students and those from middle and high socioeconomic status homes (National Center for Education Statistics, 2017b; Warren & Saliba, 2012).

Does grade retention work? In some cases, retention can be a wakeup call to children and parents. Some students show an improvement in grades and are less likely to take remedial courses (Schwerdt, West, & Winters, 2017). However, the cumulative evidence published to date shows that students who are retained in school, even in the first 2 years of elementary school, do not fare as well as promoted students. They later show poor performance in reading, mathematics, and language; poor school attendance; and more emotional and social difficulties. They also report a greater dislike for school than do their peers who were promoted (Ehmke, Drechsel, & Carstensen, 2010; Wu, West, & Hughes, 2010). Retained students are more likely to drop out of high school by age 16 (Hughes, Cao, West, Allee Smith, & Cerda, 2017). One 14-year longitudinal study confirmed the relation of retention and high school dropout; African American and Hispanic girls were most at risk for dropout

TABLE 9.4

National Association of School Psychologists' Recommendations to Enhance Academic Achievement and Reduce Retention and Social Promotion

TARGET	ACTION
Parental involvement	Encourage frequent contact with teachers and supervision of students' homework.
Instruction	Adopt age-appropriate and culturally sensitive instructional strategies. Systematically and continuously assess instructional strategies and effectiveness and modify instructional efforts in response. Implement effective early reading programs. Offer extended year, extended day, and summer school programs to develop and promote academic skills.
Student academic support	Use student support teams to identify students with specific learning or behavior problems, design interventions to address those problems, and evaluate the effectiveness of those interventions. Provide appropriate education services for children with educational disabilities, including collaboration between regular, remedial, and special education professionals.
Student psychosocial support	Create and implement school-based mental health programs that identify students in need of assistance and devise ways of aiding students. Use effective behavior management and cognitive behavior modification strategies to reduce classroom behavior problems. Establish full-service schools to organize educational, social, and health services to meet the diverse needs of at-risk students.

(Hughes et al., 2017). Dropping out of high school has long-term negative effects on postsecondary education, career, and income.

As shown in Table 9.4, the National Association of School Psychologists (2003) recommends providing students and families with a variety of academic and support resources to promote student achievement and address school failure. Promoting students to the next grade, paired with interventions that target

a student's specific needs in class and at home, can help students achieve at grade level and beyond (Jimerson & Renshaw, 2012).

What Do You Think?

Under what conditions might the issue of grade retention arise? Should students be "left back"? Why or why not? ●

tend to catch up to monolingual peers by the age of 10 years (Hoff, Rumiche, Burrigge, Ribot, & Welsh, 2014).

Second Language Learning

About 22% of school-age children in the United States speak a language other than English at home (Annie E. Casey Foundation, 2017). Of these, about one in five struggle with speaking English at school (Federal Interagency Forum on Child and Family Statistics, 2017). How should children be taught a new language? In the United States, English as a Second Language (ESL) is most often taught to children by English **immersion**, which places foreign-language-speaking children in English-speaking classes, requiring them to learn English and course content at the same time. Some studies suggest that immersion is associated with a loss in children's native language use (Baus, Costa, & Carreiras, 2013).

Another approach is **dual-language learning** (also called two-way immersion), in which English-speaking and non-English-speaking students learn together in both languages and both languages are valued equally. Advocates of dual-language learning argue that bringing a child's native language into the classroom sends children the message that their cultural heritage is respected and strengthens their cultural identity and self-esteem. Children exposed to dual-language immersion tend to retain their native language while learning the new language (Castro, Páez, Dickinson, & Frede, 2011). Longitudinal research with U.S. samples suggests that dual-language immersion approaches, which encourage students to retain their native language while learning English, are more effective than immersion approaches at promoting successful learning of English as well as overall academic achievement (Relji, Ferring, & Martin, 2015). Approaches to second language learning remain hotly debated, however.

Learning a second language during childhood often affects proficiency in the first or native language. The first language may be lost or the second language may become dominant, used more



In dual language learning, two languages are used for instruction. English-speaking and non-English-speaking students are taught in their native language and a second, new language.

AP Photo/Paul T. Erickson

often (Hoff, 2015). In one study of Chinese immigrant children in New York City, children who were under the age of 9 when they immigrated reported preferring English to Mandarin 1 year later and were more proficient in English 3 years later than children who were older than 9 at the time of immigration (Jia & Aaronson, 2003). Why the difference? The younger children became friends with children who spoke English and spent more time interacting with peers who spoke English than the older children. Peers and the surrounding community influence bilingual children's language acquisition and use, and the language that is used most becomes dominant.

A similar switch in language preference and dominance has been shown in a study of children in Southern California who first learned Spanish at home and then began to learn English at school at 5 years of age (Kohnert & Bates, 2002). The children improved their proficiency in both Spanish and English but made faster progress in English, so that by middle childhood, they were more proficient in English. Children who are living in the United States or another English-speaking country and are Spanish-English bilingual at 2 years of age often become English dominant by age 4. As a result, many

adults who grew up in Spanish-speaking homes retain little ability to speak Spanish (Hoff et al., 2014).

The ability to speak more than one language is associated with many cognitive skills. Individuals who have mastered two or more languages have higher scores on measures of memory, selective attention, analytical reasoning, concept formation, and cognitive flexibility (Bialystok, 2015). Bilingual children tend to score higher on measures of executive function, particularly the ability to control attention and ignore misleading information (Barac & Bialystok, 2012; Barac, Bialystok, Castro, & Sanchez, 2014). These effects emerge slowly over the course of several years. For example, one study of second- and fifth-grade students showed improvements over a 5-year span in tasks such as verbal fluency and executive control (Bialystok, Peets, & Moreno, 2014). Moreover, when children are able to speak, read, and write in two languages, they are more cognitively and socially flexible and can participate in both cultures.

Transition to First Grade

Most children go to kindergarten before entering first grade, and many go to preschool before kindergarten. Despite some experience with the educational system, children usually feel a mixture of excitement and anxiety upon entering first grade. For most children and parents, first grade holds symbolic value as the threshold to elementary school and older childhood.

Easing children's transition to first grade is important because adjustment and behavior during the first year of elementary school influence teachers' perceptions as well as children's views of themselves, their academic performance, and class involvement (Zafiropoulou, Sotiriou, & Mitsioli, 2007). Teachers play an important role in aiding children's adjustment to first grade. They provide both instructional and emotional support: For example, they attend to students' interests, promote initiative, provide appropriately challenging learning opportunities, and encourage positive social relationships (Cadima, Doumen, Verschueren, & Buyse, 2015). These forms of support help children develop not only academic skills but also social skills, such as self-control and the ability to follow directions (Lerkanen et al., 2016).

High-quality, sensitive, responsive, and positive interactions with teachers are associated with greater student motivation and academic achievement and fewer problems with anxiety and poor behavior throughout elementary school (Maldonado-Carreño & Votruba-Drzal, 2011; Van Craeyveldt, Verschueren, Van Craeyveldt, Wouters, & Colpin, 2017). Conversely, teacher-child conflict is associated with aggression, poor social competence, and underachievement throughout elementary

school (Runions et al., 2014; Spilt, Hughes, Wu, & Kwok, 2012; White, 2013).

First grade serves as a foundation for a child's educational career because the school curriculum of each grade builds on prior grades. Starting in first grade, reading and math skills build step by step each year, so that doing well in one year helps children perform well the next year (Entwisle, Alexander, & Steffel Olson, 2005). Early academic deficiencies often persist through the school years, and children may fall further behind with each successive year in school. In addition, children's performance in each grade is documented into a cumulative file that follows them from year to year, influencing teachers' perceptions and expectations of them, which, in turn, influences their educational success.

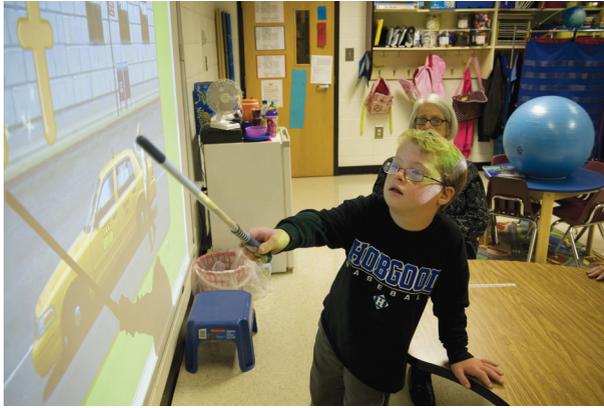
Educating Children With Special Needs

School systems must meet the needs of a diverse population of children, many with special educational needs. Children with intellectual and learning disabilities require assistance to help them overcome obstacles to learning.

Intellectual Disability

Formerly known as mental retardation, **intellectual disability** is a condition in which a child or teenager (under age 18) shows significant deficits in cognition (as defined by an IQ below 70) and in age-appropriate adaptive skills to such a degree that he or she requires ongoing support to adapt to everyday living (American Psychiatric Association, 2013). Difficulty in adaptation—the inability to appropriately modify one's behavior in light of situational demands—is essential to a diagnosis of intellectual disability (American Association on Intellectual and Developmental Disabilities, 2010). About 1% to 2% of people in the United States are diagnosed with intellectual disability (McKenzie, Milton, Smith, & Ouellette-Kuntz, 2016).

An individual with intellectual disability shows delayed development—that is, the pattern and sequence follow a typical order but at a slower rate and with limitations with respect to the final level of achievement. Children with intellectual disability are usually slower to use words and speak in complete sentences, their social development is sometimes delayed, and they may be slow to learn to dress and feed themselves. They tend to experience more behavioral problems, such as explosive outbursts, temper tantrums, and physically aggressive or self-injurious behavior, because their ability to communicate, understand, and control their emotional impulses and frustrations is impaired (Shea, 2012).



Special education classrooms that practice inclusion integrate all children into a regular classroom with additional teachers and educational support that is tailored to learning disabled students' special needs. Students with learning disabilities learn more and demonstrate more social advancement in inclusion settings.

Robin Nelson/Zuma/Corbis

There are many causes of intellectual disability. It is estimated that genetic causes may be responsible for approximately one fourth to one half of identified intellectual disability cases (Srouf & Shevell, 2014). Other biological influences include Down syndrome, metabolic disorders such as phenylketonuria, and mutations. Contextual factors include neglect, childbirth trauma, and factors associated with poverty, such as lack of access to health care and poor nutrition (Heikura et al., 2008; Schalock, 2015). Furthermore, many cases of intellectual disability have no identifiable cause.

Autistic Spectrum Disorder

Autistic spectrum disorder (ASD) is a family of neurodevelopmental disorders that range in severity and are characterized by deficits in social communication and a tendency to engage in repetitive behaviors (Hall, 2018). About 1 in 68 U.S. children are diagnosed with ASD, with males about four times as likely to be diagnosed than females (Masi, DeMayo, Glozier, & Guastella, 2017). The social and communication impairments vary widely from minor difficulties in social comprehension and perspective taking to the inability to use nonverbal or spoken language. A common characteristic of ASD is repetitive behavior, such as rocking, hand-flapping, twirling, and repeating sounds, words, or phrases. Some children with ASD experience sensory dysfunction, feeling visual, auditory, and tactile stimulation as intense and even painful.

There is evidence for a hereditary influence on ASD, but it is likely the result of multiple interacting genes rather than a single gene (Sandin et al., 2017). Moreover, epigenetics likely plays a role (Eshraghi et al., 2018). Some research has suggested that prenatal exposure to toxins, particularly mercury and lead,

maternal infections, advanced parental age, and traumatic birth complications, may heighten the risk of ASD (Modabbernia, Velthorst, & Reichenberg, 2017).

Some children with ASD are intellectually disabled; others show average or above-average intelligence (Hall, 2018). Children with ASD often show difficulties with working memory, requiring additional time to process information (Wang et al., 2017). They may benefit from instruction that emphasizes modeling, hands-on activities, and concrete examples and teaches skills for generalizing learning from one setting or problem to another (Lewis, Wheeler, & Carter, 2017).

Attention-Deficit/Hyperactivity Disorder

Attention-deficit/hyperactivity disorder (ADHD) is the most commonly diagnosed disorder in children, diagnosed in about 10% of schoolchildren in the United States (Visser et al., 2014). ADHD is a neurodevelopmental disorder characterized by persistent difficulties with attention and/or hyperactivity/impulsivity that interferes with performance and behavior in school and daily life (Hinshaw, 2018). Difficulty with attention and distractibility may manifest such as failing to attend to details, making careless mistakes, not appearing to listen when spoken to directly, not following through on instructions, or difficulty organizing tasks or activities. Impulsivity may include frequent fidgeting, squirming in seat, and leaving seat in class; often running or climbing in situations where it is not appropriate; talking excessively, often blurting out an answer before a question is completed; and having trouble waiting a turn. While most children show one or two symptoms of inattention or hyperactivity at some point in their development, a diagnosis of ADHD requires consistent display of a minimum number of specific symptoms over a 6-month period, and the symptoms must interfere with behavior in daily life (Hinshaw, 2018).

ADHD has biological causes and is nearly 80% heritable (Aguilar, Eubig, & Schantz, 2010; Schachar, 2014). Research studying identical twins who are not concordant for ADHD has suggested a role for epigenetics in determining the degree to which genetic propensities are expressed (Chen et al., 2018). Environmental influences on ADHD include premature birth, maternal smoking, drug and alcohol use, lead exposure, and brain injuries (Tarver, Daley, & Sayal, 2014; Thapar, Cooper, Eyre, & Langley, 2013).

Stimulant medication is the most common treatment for ADHD. Stimulant medication increases activity in the parts of the brain that are responsible for attention, self-control, and behavior inhibition (Hawk et al., 2018). Behavioral interventions can help

children learn strategies to manage impulses and hyperactivity, direct their attention, and monitor their behavior (S. W. Evans, Owens, Wymbs, & Ray, 2018).

Learning Disabilities

Learning disabilities are diagnosed in children who demonstrate a measurable discrepancy between aptitude and achievement in a particular academic area given their age, intelligence, and amount of schooling (American Psychiatric Association, 2013). Children with learning disabilities have difficulty with academic achievement despite having normal intelligence and sensory function. **Developmental dyslexia** is the most commonly diagnosed learning disability. Children with dyslexia demonstrate age-inappropriate difficulty in matching letters to sounds and difficulty with word recognition and spelling despite adequate instruction and intelligence and intact sensory abilities (Peterson & Pennington, 2012; Ramus, 2014). Dyslexia is estimated to affect 5% to nearly 18% of the school population, boys and girls equally.

Dyslexia is influenced by genetics (Carrion-Castillo, Franke, & Fisher, 2013). Children with dyslexia have a neurologically based difficulty in processing speech sounds. During speech tasks, they use different regions of the brain than other children, and they are unable to recognize that words consist of small units of sound, strung together and represented visually by letters (Lonigan, 2015; Schurz et al., 2015). Abnormalities in the brain areas responsible for reading can be seen in 11-year-olds with dyslexia but not in young children who have not been exposed to reading, suggesting that the brain abnormalities associated with dyslexia occur after reading commences (K. A. Clark et al., 2014). Successful interventions include not only training in phonics but also supporting emerging skills by linking letters, sounds, and words through writing and reading from developmentally appropriate texts (Snowling, 2013).

Another common learning disability is **dyscalculia**, mathematics disability. Children with dyscalculia are slow in learning mathematical concepts such as counting, addition, and subtraction and have a poor understanding of these concepts (Gilmore, McCarthy, & Spelke, 2010; Kucian & von Aster, 2015). In early elementary school, they may use relatively ineffective strategies for solving math problems, such as using their fingers to add large sums. Dyscalculia is thought to affect about 5% of students and is not well understood (Kaufmann et al., 2013; Rapin, 2016). Research suggests that it is influenced by brain functioning and difficulty with working memory and executive function, specifically visuospatial short-term memory and

inhibitory function (Menon, 2016; Watson & Gable, 2013). Children with dyscalculia are usually given intensive practice to help them understand numbers, but there is much to learn about this disorder (Bryant et al., 2016; Fuchs, Malone, Schumacher, Namkung, & Wang, 2017).

Special Education

In the United States and Canada, legislation mandates that children with disabilities are to be placed in the “least restrictive” environment, or classrooms that are as similar as possible to classrooms for children without learning disabilities. Whenever possible, children are to be educated in the general classroom, with their peers, for all or part of the day. This is known as mainstreaming. Classes that practice mainstreaming have teachers who are sensitive to the special needs of students with learning disabilities and provide additional instruction and extra time for them to complete assignments. The assumption is that when children are placed in regular classrooms with peers of all abilities, they are better prepared to function in society. Some mainstreamed children benefit academically and socially, but others do not. Children’s responses to mainstreaming vary with the severity of their disabilities as well as the quality and quantity of support provided in the classroom (Lewis et al., 2017).

Mainstreaming works best when children receive instruction in a resource room that meets their specialized needs for part of the school day and the regular classroom for the rest of the school day.



THINKING IN CONTEXT 9.6

1. What are some of the socioemotional challenges that a child learning a second language might face? Consider the child’s emotions, social relationships, and sense of self. How might the cognitive task of learning a second language influence (and be influenced by) socioemotional factors?
2. What do you remember of your experiences in first grade—your teacher, your classmates, how you spent your days? In your view, what is the purpose of first grade? What kinds of learning experiences are most important for children to have when they start school?
3. Suppose you were tasked with creating a class environment that would address the needs of children with intellectual disabilities and learning disabilities as well as children without disabilities. What would your environment include? What are some of the challenges in creating such an environment?

Children with learning disabilities report preferring combining time in the regular classroom with time in a resource room that is equipped with a teacher who is trained to meet their special learning needs (Vaughn & Klingner, 1998). Interaction with peers and cooperative learning assignments that require children to work together to achieve academic goals help students with learning disabilities learn social skills and form friendships with peers.

A more recent approach to special education is inclusion, which refers to including children with learning disabilities in the regular classroom but providing them with a teacher or paraprofessional specially trained to meet their needs (Mastropieri & Scruggs, 2017). Inclusion is different from mainstreaming in that it entails additional

educational support tailored to the learning disabled students' special needs. With an inclusion arrangement, students with learning disabilities are placed in the regular classroom, but for part of the day, they are taught separately in a resource room (Salend, 2015). Some argue that students' move from the regular classroom to resource room is disruptive to other children (Ainscow & Messiou, 2018). Around the world, children learn strategies to succeed despite their limitations, but the disabilities themselves and the academic and social challenges posed by them do not disappear. Parents and teachers are most helpful when they understand that learning disabilities are not a matter of intelligence or laziness but rather a function of brain differences and when they help children to learn to monitor their behavior.



APPLY YOUR KNOWLEDGE

Dashawn sighs as he reads the next question. "Hmmm, which one of the following words best match the word *cup*," he reads to himself, "*wall, table, saucer, or window?*" Dashawn isn't sure what a saucer is. He concludes, "It must be *table*—you put a cup on a table." Dashawn finds that there are a lot of words he doesn't know on this test, like *regatta*, and situations that didn't make a lot of sense to him, like examples that refer to gardening and playing tennis. "Boy, this is a long test," he mutters to himself.

The next day, Dashawn takes a deep breath and begins his tumbling routine, hurtling his way down the mat, completing a series of forward flips and finishing with a back flip. "Fantastic!" shouts Coach Dawkins, "We should work on your timing, but keep it up and you'll be on your way to winning the state championship."

Later that week, Coach Dawkins arrives at the elementary school conference room to meet with the school's student troubleshooting team. The principal, school psychologist, and Dashawn's teacher are in attendance. The school psychologist, Dr. Martinez, begins, "I've brought us together to talk about Dashawn. I'm concerned that he may have special learning needs. His intelligence test scores show a large discrepancy in his performance on verbal and nonverbal test items. I'd like to learn more about your experiences with Dashawn before I contact his parents." As they speak, Dr. Martinez takes notes and creates a profile of Dashawn. Coach Dawkins explains

that Dashawn is the most talented gymnast he's coached in his entire career. Dashawn's teacher agrees that he's a hard worker, sociable, and well liked by his classmates. His teacher explains that Dashawn's performance in math is in line with his classmates, but he is a bit behind in English. Dashawn is not the most talented student in class, but he seems to be a quick learner—when he's not fidgeting or requesting to go to the restroom way more often than necessary for a 9-year-old. Dr. Martinez concludes that Dashawn's IQ test scores may not indicate serious cognitive and academic problems, but he decides to monitor Dashawn's progress and discuss his concerns with Dashawn's parents.

1. Identify reasons why Dashawn might be unfamiliar with some words and terms used in the intelligence test. How might tests be modified to be fair to children of all backgrounds? What do you recommend?
2. Why might have Dashawn scored higher on the performance scale than the verbal scale? Discuss developmental reasons that might underlie his performance. Are there other possible reasons?
3. How might Dashawn's performance be explained using multiple intelligence theory? The triarchic theory of intelligence?



Visit edge.sagepub.com/kuther2e to help you accomplish your coursework goals in an easy-to-use learning environment.

LEARNING OBJECTIVES	SUMMARY	KEY TERMS	IN REVIEW
9.1 Identify patterns of physical and motor development during middle childhood and common health issues facing school-age children.	During middle childhood, growth in height and weight slows, and children demonstrate increases in strength, speed, reaction time, flexibility, balance, and coordination. Advances in growth and motor development are influenced by genetic and contextual factors. Middle childhood is a time of health, but injuries and obesity pose risks to children. Childhood obesity is associated with short- and long-term physical and psychological health problems, and most children do not grow out of obesity but instead become obese adults. Programs that are effective at reducing childhood obesity decrease children's television and video game use, increase their physical activity, and teach children about nutrition.	Body mass index (BMI) Obesity Body image dissatisfaction	How do body growth and motor skills advance in middle childhood? What are biological and contextual influences on growth and motor skills? What are the most common health issues facing school-age children?
9.2 Discuss school-age children's capacities for reasoning and processing information.	At about age 7, children enter the concrete operational stage of reasoning, permitting them to use mental operations to solve problems and think logically, and to demonstrate several different kinds of classification skills and make advances in solving conservation tasks. Concrete operational reasoning is found in children around the world; however, experience, specific cultural practices, and education play a role in development. Brain maturation leads to improvements in executive functioning and attention, memory, response inhibition, and processing speed. As children's understanding of their own thinking and memory increases, they get better at selecting and using mnemonic strategies and become more planful.	Concrete operational stage of reasoning Classification Transitive inference Seriation Class inclusion Metamemory Rehearsal Organization Elaboration	What abilities mark the concrete operational reasoning? How do changes in working memory, executive function, and metacognition influence children's thinking and memory? What is the role of context and experience in cognitive development in middle childhood?
9.3 Summarize views of intelligence, including the uses, correlates, and criticisms of intelligence tests.	IQ tests measure intellectual aptitude and are often used to identify children with special educational needs. IQ predicts school achievement, how long a child will stay in school, and career attainment in adulthood. Persistent group differences are found in IQ scores, but contextual factors, such as socioeconomic status, living conditions, school resources, culture, and life circumstances, are thought to account for group differences. Multiple intelligence theory and the triarchic theory of intelligence conceptualize intelligence as entailing a more broad range of skills than those measured by IQ tests.	Intelligence tests (IQ tests) Flynn effect Multiple intelligence theory Triarchic theory of intelligence	What is intelligence? What is the most common IQ test, and how does it define intelligence? What are contextual influences on IQ scores? What are two alternative theories of intelligence?
9.4 Examine patterns of moral development during middle childhood.	Until about age 9, children demonstrate preconventional reasoning in Kohlberg's theory of moral development, moving from concern with punishment as a motivator of moral judgments (Stage 1) to self-interest and concern about what others can do for them (Stage 2). In late childhood, children advance to conventional moral reasoning in which they internalize the norms and standards of authority figures, becoming concerned with pleasing others (Stage 3) and maintaining social order (Stage 4). School-age children's views of fairness become more sophisticated, and they become more likely to consider the situation and weigh a variety of variables in making decisions.	Autonomous morality Conventional moral reasoning	What is autonomous morality? What is conventional moral reasoning? What is distributive justice reasoning? How do children distinguish between moral and conventional rules? What factors influence moral development?

<p>9.5 Summarize language development during middle childhood.</p>	<p>Vocabulary expands fourfold during the elementary school years. School-age children learn words through contextual cues and by comparing complex words with simpler words. Understanding of complex grammatical structures, syntax, and pragmatics improves in middle childhood with experience with language and exposure to complex constructions, and children become better communicators.</p>	<p>Pragmatics</p>	<p>What advances in vocabulary and grammar take place during middle childhood? Provide an example illustrating the development of pragmatics.</p>
<p>9.6 Discuss children's learning at school.</p>	<p>Phonics methods are highly effective in teaching reading, yet most schools employ the whole-language approach, and a substantial number of U.S. children are poor readers. U.S. students' mathematical skills have improved over the past two decades, yet nearly one in five U.S. schoolchildren is deficient in math skills. Fluency in two languages is associated with higher scores on measures of selective attention, executive function, analytical reasoning, concept formation, and cognitive flexibility. Bilingual approaches to language learning are more effective than immersion approaches at teaching language and promoting academic achievement in children. In the United States and Canada, legislation mandates that, whenever possible, children with intellectual and learning disabilities are to be mainstreamed and educated in the general classroom, with their peers, for all or part of the day. However, the effectiveness of mainstreaming varies with the severity of the disability as well as the quality and quantity of support provided in the classroom.</p>	<p>Phonics instruction Immersion Dual-language learning Intellectual disability Autistic spectrum disorder Attention-deficit/hyperactivity disorder Developmental dyslexia Dyscalculia</p>	<p>What approaches are used to teach reading and mathematics? What are two approaches to teaching English language learners? What are common disabilities that are aided by special education? What are methods for educating children with special needs?</p>

Do not copy, post, or distribute