Think back over your lifetime. How have you grown and changed through the years? Do your parents describe you as a happy baby? Were you fussy? Do you remember your first day of kindergarten? What are some of your most vivid childhood memories? Did you begin puberty early, late, or was your development similar to others your age? Were your adolescent years a stressful time? What types of changes do you expect to undergo in your adult years? Where will you live? Will you have a spouse? Will you have children? What career will you choose? How might these life choices and circumstances influence how you age and your perspective in older adulthood? Will your personality remain the same or change over time? In short, how will you change over the course of your lifespan?

WHAT IS LIFESPAN HUMAN DEVELOPMENT?

LO 1.1 Outline five principles of the lifespan developmental perspective.

This is a book about lifespan human development—the ways in which people grow, change, and stay the same throughout their lives, from conception to death.
When people use the term *development*, they often mean the transformation from infant to adult. However, development does not end with adulthood. We continue to change in predictable ways throughout our lifetime, even into old age. Developmental scientists study human development. They seek to understand lifetime patterns of change.

Table 1.1 illustrates the many phases of life that we progress through from conception to death. Each phase of life may have a different label and set of developmental tasks, but all have value. The changes that we undergo during infancy influence how we experience later changes, such as those during adolescence and beyond. This is true for all ages in life. Each phase of life is important and accompanied by its own demands and opportunities.

Change is the most obvious indicator of development. The muscle strength and coordination needed to play sports increases over childhood and adolescence, peaks in early adulthood, and begins to decline thereafter, declining more rapidly from middle to late adulthood. Similarly, children's capacity to learn and perform cognitive tasks increases as they progress from infancy through adolescence, and adults typically experience a decline in the speed of cognitive processing. However, there also are ways in which we change little over our lifetimes. Some personality traits, for example, are highly stable.

### Table 1.1: Ages in Human Development

<table>
<thead>
<tr>
<th>LIFE STAGE</th>
<th>APPROXIMATE AGE RANGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal</td>
<td>Conception to birth</td>
<td>Shortly after conception, a single-celled organism grows and multiplies. This is the most rapid period of physical development in the lifespan as basic body structures and organs form and grow. The fetus hears, responds to sensory stimuli (such as the sound of its mother's voice), learns, remembers, and begins the process of adjusting to life after birth.</td>
</tr>
<tr>
<td>Infancy and toddlerhood</td>
<td>Birth to 2 years</td>
<td>The newborn is equipped with senses that help it to learn about the world. Environmental influences stimulate the brain to grow more complex, and the child interacts with her environment, shaping it. Physical growth occurs as well as the development of motor, perceptual, and intellectual skills. Children show advances in language comprehension and use, problem solving, self-awareness, and emotional control. They become more independent and interested in interacting with other children and form bonds with parents and others.</td>
</tr>
<tr>
<td>Early childhood</td>
<td>2 to 6 years</td>
<td>Children grow steadily over these years of play prior to beginning elementary school. Children's muscles strengthen, and they become better at controlling and coordinating their bodies. Children's bodies become more slender and adultlike in proportions. Memory, language, and imagination improve. Children become more independent and better able to regulate their emotions as well as develop a sense of right and wrong. Children become more aware of their own characteristics and feelings. Family remains children's primary social tie, but other children become more important and new ties to peers are established.</td>
</tr>
<tr>
<td>Middle childhood</td>
<td>6 to 11 years</td>
<td>Growth slows, and health tends to be better in middle childhood than at any other time during the lifespan. Strength and athletic ability increase dramatically. Children show improvements in their ability to reason, remember, read, and use arithmetic. As children advance cognitively and gain social experience, they understand themselves and think about moral issues in more complex ways as compared with younger children. As friendships develop, peers and group memberships become more important.</td>
</tr>
<tr>
<td>Adolescence</td>
<td>11 to 18 years</td>
<td>Adolescents' bodies grow rapidly. They become physically and sexually mature. Though some immature thinking persists, adolescents can reason in sophisticated and adultlike ways. Adolescents are driven to learn about themselves and begin the process of discovering who they are, apart from their parents. Most adolescents retain good relationships with parents, but peer groups increase in importance. Adolescents and their peers influence each other reciprocally. It is through adolescents' interactions with family and peers that they begin to establish a sense of who they are.</td>
</tr>
<tr>
<td>Early adulthood</td>
<td>18 to 40 years</td>
<td>In early adulthood, physical condition peaks and then shows slight declines with time. Lifestyle choices, such as smoking, diet, and physical activity, play a large role in influencing health. As they enter early adulthood, young adults experience</td>
</tr>
</tbody>
</table>
## Development Is Multidimensional

Physical changes such as body growth are the most obvious forms of development. Not only do our bodies change, but so do our minds, the ways in which we show emotion, and our social relationships. In this way, development is **multidimensional**: It entails changes in many areas of development, including the physical, the cognitive, and the socioemotional (Baltes et al., 1998; Baltes, 1997; Staudinger & Lindenberger, 2003). **Physical development** refers to body maturation and growth, including body size, proportion, appearance, health, and perceptual abilities. **Cognitive development** refers to the maturation of thought processes and the tools that we use to obtain knowledge, become aware of the world around us, and solve problems. **Socioemotional development** includes changes in personality, emotions, views of oneself, social skills, and interpersonal relationships with family and friends. Each of these areas of development overlap and interact. With advances in

<table>
<thead>
<tr>
<th>LIFE STAGE</th>
<th>APPROXIMATE AGE RANGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle adulthood</td>
<td>40 to 65 years</td>
<td>In middle adulthood, people begin to notice changes in their vision, hearing, physical stamina, and sexuality. Basic mental abilities, expertise, and practical problem-solving skills peak. Career changes and family transitions require that adults continue to refine their understandings of themselves. Some adults experience burnout and career changes while others enjoy successful leadership positions and increased earning power at the peak of their careers. Stress stems from assisting children to become independent, adapting to an empty nest, and assisting elderly parents with their health and personal needs.</td>
</tr>
<tr>
<td>Late adulthood</td>
<td>65 years and beyond</td>
<td>Most older adults remain healthy and active despite physical declines. Reaction time slows, and most older adults show decline in some aspects of memory and intelligence, but an increase in expertise and wisdom compensates for losses. Most older adult friendships are old friendships, and these tend to be very close and a source of support. At the same time, older adults are less likely to form new friendships than at other times in life. They face adjustments to retirement, confront decreased physical health and strength, cope with personal losses (such as the death of a loved one), think about impending death, and search for meaning in their lives.</td>
</tr>
<tr>
<td>Death</td>
<td></td>
<td>Death itself is a process. Regardless of whether it is sudden and unexpected, the result of a lengthy illness, or simply old age, death entails the stopping of heartbeat, circulation, breathing, and brain activity. A person’s death causes changes in his or her social context—family members and friends must adjust to and accept the loss.</td>
</tr>
</tbody>
</table>

over the lifespan, so that we remain largely the “same person” into old age (McCrae, 2002; Roberts & Caspi, 2003; Wortman, Lucas, & Donnellan, 2012).

Lifespan human development can be described by several principles. As discussed in the following sections, development is: (1) multidimensional, (2) multidirectional, (3) plastic, (4) influenced by multiple contexts, and (5) multidisciplinary (Baltes & Carstensen, 2003; Baltes, Lindenberger, & Staudinger, 1998; Baltes, 1997).

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**Physical development**
Body maturation, including body size, proportion, appearance, health, and perceptual abilities.

**Cognitive development**
Maturation of mental processes and tools individuals use to obtain knowledge, think, and solve problems.

**Socioemotional development**
Maturation of social and emotional functioning, which includes changes in personality, emotions, personal perceptions, social skills, and interpersonal relationships.
cognitive development, for example, a child may become better able to take her best friend’s point of view, which in turn influences her socioemotional development as she becomes more empathetic and sensitive to her friend’s needs and develops a more mature friendship. Figure 1.1 illustrates these three areas of development and how they interact.

**DEVELOPMENT IS MULTIDIRECTIONAL**

Development is commonly described as a series of improvements in performance and functioning, but in fact development is *multidirectional*, meaning that it consists of both gains and losses, growth and decline, throughout the lifespan (Baltes et al., 1998; Baltes, 1997; Staudinger & Lindenberger, 2003). For example, we are born with a stepping reflex, an innate involuntary response in which infants make step-like movements when held upright over a table, bed, or hard horizontal surface (for more on infant reflexes, see Chapter 4). Over the first year, infants gain new motor skills and the stepping reflex disappears (Thelen, Fisher, & Ridley-Johnson, 2002). As another example of multidirectionality, in older adulthood people’s social networks narrow and they have fewer friends; however, their relationships become more significant and meaningful (Carstensen & Mikels, 2005). Throughout life there is a shifting balance between gains and improvements in performance (common early in life) and losses and declines in performance (common late in life; Baltes & Carstensen, 2003). At all ages, however, individuals can compensate for losses by improving existing skills and developing new ones (Boker, 2013; Freund & Baltes, 2007). For example, though the speed at which people think tends to slow in older adulthood, increases in knowledge and experience enable older adults to compensate for the loss of speed, so that they generally retain their ability to complete day-to-day tasks and solve everyday problems (Bluck & Gluck, 2004; Hess, Leclerc, Swaim, & Weatherbee, 2009; Margrett, Allaire, Johnson, Daugherty, & Weatherbee, 2010). Outside of our awareness, the brain naturally adapts to a lifetime of sensory experiences in order to portray the world around us efficiently and accurately as we age well into older adulthood (Moran, Symmonds, Dolan, & Friston, 2014).

**DEVELOPMENT IS PLASTIC**

Development is characterized by *plasticity*: It is malleable or changeable. Frequently the brain and body can compensate for illness and injury. Children who are injured and experience brain damage may show resilience as other parts of the brain take on new functions. The plastic nature of human development allows people to modify their traits, capacities, and behavior throughout life (Baltes et al., 1998; Baltes, 1997; Staudinger & Lindenberger, 2003). For example, older adults who have experienced a decline in balance and muscle strength can regain and improve these capabilities through exercise (McAuley et al., 2013). Plasticity generally tends to decline as we age, but it does not disappear entirely. Short instruction, for instance, can enhance the memory capacities of very old adults, but less so than younger...
adults (Singer, Lindenberger, & Baltes, 2003). Thus, memory plasticity is preserved, but to a reduced degree, in very old age. Plasticity makes it possible for individuals to adjust to change and to demonstrate **resilience**, which is the capacity to adapt effectively to adverse contexts and circumstances (Luthar et al., 2015; Masten, 2016).

**DEVELOPMENT IS INFLUENCED BY MULTIPLE CONTEXTS**

In its simplest terms, **context** refers to where and when a person develops. Context includes aspects of the physical and social environment such as family, neighborhood, country, culture, and historical time period. Context also includes intangible factors, characteristics that are not visible to the naked eye, such as values, customs, and ideals. Culture is a particularly important context that influences us, as illustrated in Cultural Influences on Development: Defining Culture.

In order to understand a given individual’s development, we must look to his or her context. For example, consider the context in which you were raised. Where did you grow up? City? Suburb? Rural area? What was your neighborhood like? Were you encouraged to be assertive and actively question the adults around you, or were you expected to be quiet and avoid confrontation? How large a part was religion in your family’s life? How did religious values shape your parent’s child-rearing practices and your own values? How did your family’s economic status affect your development?

An important context that influences our development is the time period in which we live. Some contextual influences are tied to particular historical eras and explain why a generation of people born at the same time, called a **cohort**, are similar in ways that people born at other times are different. History-graded influences include wars, epidemics, and economic shifts such as periods of depression or prosperity (Baltes, 1987). These influences shape our development and our views of the world—and set cohorts apart from one another. Adults who came of age during the Great Depression and World War II are similar in some ways that make them different from later cohorts; for example, they tend to have particularly strong views on the importance of the family, civic mindedness, and social connection (Rogler, 2002). Age-graded influences, those tied to chronological age, such as the age at which the average person enters school, reaches puberty, graduates from high school, gets married, or has children, are also shaped by context as the normative age of each of these events has shifted over the last few generations (Baltes, 1987).

What roles have larger historical events played in your development? For example, consider Hurricane Sandy of October 2012, the second costliest hurricane in U.S. history, which affected 24 states, including the entire eastern seaboard, with flooding, downed power lines, and many destroyed homes. Historical events include the terrorist attacks of September 11, 2001; the election of the first African American president of the United States in 2008; and the school shooting in Newtown, Connecticut in 2012. How have historical events influenced you and those around you? Can you identify ways in which your cohort differs from your parents’ cohort because of historical events?

**DEVELOPMENTAL SCIENCE IS MULTIDISCIPLINARY**

To say that people are complex is an understatement. Scientists who study lifespan human development attempt to understand people’s bodies, minds, and social worlds. The contributions of many disciplines are needed to understand how people grow, think, and interact with their world. Psychologists, sociologists, anthropologists, biologists, neuroscientists,
CULTURAL INFLUENCES ON DEVELOPMENT

**Defining Culture**

Cultural influences on development are illustrated by the many ethnic communities that comprise most U.S. cities. What subcultures and neighborhoods can you identify in your community?

A large and influential part of our context is culture, which is the set of customs, knowledge, attitudes, and values that are shared by members of a group and are learned early in life through interactions with group members (Hofstede, 2001). Most classic theories and research on human development are based on Western samples, and developmental researchers once believed that the processes of human development were universal. Early studies of culture and human development took the form of cross-cultural research, comparing individuals and groups from different cultures to examine how these universal processes worked in different contexts (Gardiner & Kosmitzki, 2002).

More recently we have learned that the cultural context in which individuals live influences the timing and expression of many aspects of development (Gardiner & Kosmitzki, 2002). For example, the average age that infants begin to walk varies with cultural context. In Uganda, infants begin to walk at about 10 months of age, in France at about 15 months, and the United States at about 12 months. These differences are influenced by parenting practices that vary by culture. African parents tend to handle infants in ways that promote walking, by playing games that allow infants to practice jumping and walking skills (Hopkins & Westra, 1989; Super, 1981). Developmental researchers have argued that because much of the research in human development has focused on individuals from Western industrialized societies, there is a danger of defining typical development in Western samples as the norm, which can lead to narrow views of human development that do not take into account the variety of contexts in which people live. At the extreme, differences in human development within other cultural groups might be viewed as abnormal (Rogoff & Morelli, 1989). Some argue that cross-cultural research that compares the development of people from different cultures in order to understand universals in development is misguided because norms vary by cultural context (Schweder et al., 1998).

There is a growing trend favoring cultural research, which examines how culture influences development, over cross-cultural research, which simply examines differences among cultures (Schweder et al., 1998). From a cultural research perspective, culture influences our development because it contributes to the context in which we are embedded, transmitting values, attitudes, and beliefs that shape our thoughts, beliefs, and behaviors (Cole, 1999). The shift toward cultural research permits the examination of the multiple cultures that exist within a society. For example, North American culture is not homogenous; many subcultures exist, defined by factors such as ethnicity (e.g., African American, Asian American), religion (e.g., Christian, Muslim), geography (e.g., southern, Midwestern), and others, as well as combinations of these factors. Instead of looking for universal similarities in development, cultural research in human development aims to document diversity and understand how the historical and cultural context in which we live influences development throughout our lifetime (Schweder et al., 1998).

**What Do You Think?**

1. How would you describe North American culture? Can you identify aspects of North American culture that describe most, if not all, people who live there? Are there aspects of culture in which people or subgroups of people differ?

2. What subcultures can you identify in your own neighborhood, city, state, or region of the country? What characterizes each of these subcultures?

3. Consider your own experience. With which culture or subculture do you identify? How much of a role do you think your cultural membership has had in your own development?

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culture A set of customs, knowledge, attitudes, and values shared by a group of people and learned through interactions with group members.

and medical researchers all conduct research that is relevant to understanding aspects of human development. For example, consider cognitive development. Children's performance on cognitive measures, such as problem solving, are influenced by their physical health and nutrition (Anjos et al., 2013), interactions with peers (Fawcett & Garton, 2005; Holmes, Kim-Spoon, & Deater-Deckard, 2016), and neurological development (Ullman, Almeida, & Klingberg, 2014)—findings from the fields of medicine, psychology, and neuroscience, respectively. In order to understand how people develop at all periods in life, developmental scientists must combine insights from all of these disciplines.
The field of lifespan human development studies the ways in which people grow, change, and stay the same throughout their lives. Human development is complex. We change in multiple ways, show gains and losses over time, and retain the ability to change over our lifespan. The context in which we live influences who we become. Developmental science incorporates research from multiple disciplines.

**Thinking in Context 1.1**

1. Describe your own development. In what ways have you changed over your lifetime? What characteristics have remained the same?
2. Lifespan human development is multidimensional, multidirectional, plastic, and influenced by multiple contexts. Consider your own experience and provide examples from your life that illustrate the multidimensional nature of your own development. Can you do the same for multidirectionality and for plasticity? How does the context in which you were raised and live influence your development?
3. Compare the historical context in which you, your parents, and your grandparents were raised. How did historical and societal influences affect your grandparents’ development, their world view, and their child-rearing strategies? What about your parents? How might historical influences affect your own development, world view, and perspective on parenting?

**BASIC ISSUES IN LIFESPAN HUMAN DEVELOPMENT**

**LO 1.2 Discuss three theoretical controversies about human development.**

Developmental scientists agree that people change throughout life and show increases in some capacities and decreases in others from conception to death. Yet, how development proceeds, the specific changes that occur, and the causes of change are debated. Developmental scientists’ explanations of how people grow and change over their lives are influenced by their perspectives on three basic issues, or fundamental questions, about human development:

1. Do people remain largely the same over time, or do they change dramatically?
2. What role do people play in their own development? How much are they influenced by their surroundings, and how much do they influence their surroundings?
3. To what extent is development a function of inborn genetic endowments, as compared with the environment in which individuals live?

The following sections examine each of these questions.

**CONTINUITIES AND DISCONTINUITIES IN DEVELOPMENT**

Do children slowly grow into adults, steadily gain more knowledge and experience, and become better at reasoning? Or do children grow in spurts, showing sudden and large gains in knowledge and reasoning capacities? In other words, in what ways is developmental change **continuous**, characterized by slow and gradual change, or **discontinuous**, characterized by abrupt change? As shown in Figure 1.2, a discontinuous view of development emphasizes sudden transformation in abilities and capacities whereas a continuous view emphasizes the gradual and steady changes that occur. Scientists who argue that development is continuous in nature point to slow and cumulative changes we experience in the amount or degree of skills, such as a child slowly gaining experience, expanding his or her vocabulary, and becoming quicker at problem solving, or a middle-aged adult experiencing gradual losses of muscle and strength. The discontinuous view of development describes the changes we experience as large and abrupt, with individuals of **continuous development** The view that development consists of gradual cumulative changes in existing skills and capacities.  **discontinuous development** The view that growth entails abrupt transformations in abilities and capacities in which new ways of interacting with the world emerge.
various ages dramatically different from one another. For example, puberty quickly transforms children’s bodies into more adult-like adolescent bodies, infants’ understanding and capacity for language is fundamentally different from that of school-aged children, and children make leaps in their reasoning abilities over the course of childhood (Piek, Dawson, Smith, & Gasson, 2008). For example, children progress from believing that robotic dogs and other inanimate objects are alive to understanding that life is a biological process (Gelman & Opfer, 2002).

It was once believed that development was either continuous or discontinuous—that changes were either slow and gradual or sudden and dramatic—but not both. Today, developmental scientists agree that development includes both continuity and discontinuity (Kagan, 2008; Lerner, Agans, DeSouza, & Gasca, 2013; Miller, 2016). Whether a particular developmental change appears continuous or discontinuous depends on our point of view. For example, consider human growth. We often think of increases in height as a slow and steady process of simply getting taller with time; each month infants are taller than the prior month, illustrating continuous change. However, as shown in Figure 1.3, when researchers measured infants’ height every day they discovered that infants have growth days and non-growth days, days that they show rapid change in height interspersed with days in which there is no change in height, thus illustrating discontinuous change (Lampl, Johnson, Frongillo Jr., & Frongillo, 2001; Lampl, Veldhuis, & Johnson, 1992). In this example, monthly measurements of infant height suggest gradual increases, but daily measurements show spurts of growth, each lasting 24 hours or less. In this way, whether a given phenomenon, such as height, is described as continuous or discontinuous can vary. Most developmental scientists agree that some aspects of lifespan development are best described as continuous and others as discontinuous (Miller, 2016).

**FIGURE 1.2: Continuous and Discontinuous Development**

(a) Continuous Development  
(b) Discontinuous Development

**FIGURE 1.3: Infant Growth: A Continuous or Discontinuous Process?**

Infants’ growth occurs in a random series of roughly 1-centimeter spurts in height that occur in 24 hours or less. The overall pattern of growth entails increases in height, but whether the growth appears to be continuous or discontinuous depends on our point of view.

Do people have a role in influencing how they change over their lifetimes? That is, are people active in influencing their own development? Taking an active role means that they interact with and influence the world around them, create experiences that lead to developmental change, and thereby influence how they themselves change over the lifespan. Alternatively, if individuals take a passive role in their development, they are shaped by, but do not influence, the world around them—including home and relationships with family, school, and neighborhood characteristics, such as the availability of playgrounds or health care.

The prevailing view among developmental scientists is that people are active contributors to their own development. People are influenced by the physical and social contexts in which they live, but they also play a role in influencing their development by interacting with, and changing, those contexts. Even infants influence the world around them and construct their own development through their interactions. Consider an infant who smiles at each adult he sees; he influences his world because adults are likely to smile, use “baby talk,” and play with him in response. The infant brings adults into close contact, making one-on-one interactions and creating opportunities for learning. By engaging the world around them, thinking, being curious, and interacting with people, objects, and the world around them, individuals of all ages are “manufacturers of their own development” (Flavell, 1992, p. 998).

Perhaps the most fundamental question about lifespan human development is: What is its cause? Why do people change in predictable ways over the course of their lifetimes? The answer to this question reflects perhaps the oldest and most heated debate within the field of human development: the nature–nurture issue. Is development caused by nature or nurture? Explanations that rely on nature point to inborn genetic endowments or heredity, maturational processes, and evolution as causes of developmental change. For example, most infants take their first steps at roughly the same age as other children, suggesting a maturational trend that supports the role of nature in development. An alternative explanation for developmental change is nurture, the view that individuals are molded by the physical and social environment in which they are raised, including the home, school, workplace, neighborhood, and society. From this perspective, although most begin to walk at about the same time, environmental conditions can speed up or slow down the process. Infants who experience malnutrition may walk later than well-nourished infants, and—as mentioned in Cultural Influences on Development—those who are given practice making stepping or jumping movements may walk earlier (Sigman, 1995; Vereijken & Thelen, 1997; Worobey, 2014).

Although developmental scientists once attempted to determine whether nature or nurture influenced development, most now agree that both nature and nurture are important contributors (Grigorenko & Sternberg, 2003; Scarr & McCartney, 1983). As in the prior example, walking is heavily influenced by maturation (nature), but experiences and environmental conditions can influence the timing of a child’s first steps (nurture). Today developmental scientists attempt to determine how nature and nurture work together to influence how people grow and change throughout life (Anastasi, 1958; Crews, Gillette, Miller-Crews, & Gore, 2014; Rutter, 2012).
To review, there are three basic questions regarding lifespan human development:

1. Do people remain largely the same over time, showing continuity, or do they change dramatically, illustrating discontinuity?

2. What role do people play in their own development? How much are they influenced by their surroundings, and how much do they influence their surroundings? To what degree are they active or passive participants in their development?

3. To what extent is development a function of inborn genetic endowments, as compared with the environment in which individuals live?

Developmental scientists vary in their responses to these questions, as we will discover throughout this book. Different answers reflect different assumptions about the causes of development and different explanations for human development.

**Thinking in Context 1.2**

1. Can you identify ways in which you have changed very gradually over the years? Were there other times in which you showed abrupt change, such as physical growth, strength and coordination, thinking abilities, or social skills? In other words, in what ways is your development characterized by continuity? Discontinuity?

2. Are people active or passive participants in their development? What role did your physical and social environment play in your growth? In what ways, if any, did you take an active role in your own development?

3. How much of who you are today is a function of nature? Nurture?

**THEORETICAL PERSPECTIVES ON HUMAN DEVELOPMENT**

**LO 1.3 Summarize five theoretical perspectives on human development.**

Human development researchers offer many theoretical explanations for the changes that occur over the lifetime. Over the past century, developmental scientists have learned much about how individuals progress from infants to children to adolescents, and to adults, as well as how they change throughout adulthood. Scientists explain their observations by constructing theories of human development. A **theory** is a way of organizing a set of observations or facts into a comprehensive explanation of how something works. Theories are important tools for compiling and interpreting the growing body of research in human development as well as determining gaps in our knowledge about a given phenomenon and making predictions about what is not yet known (Crain, 2011; Green & Piel, 2010; Miller, 2016).

Effective theories generate specific **hypotheses**, or proposed explanations for a given phenomenon, that can be tested by research. It is important to note that this testing seeks to find flaws in the hypothesis—not to “prove” that it is flawless. A good theory is one that is **falsifiable**, or capable of generating hypotheses that can be tested and, potentially, refuted. As scientists conduct research and learn more about a topic, they modify their theories. Updated theories often give rise to new questions and new research studies, whose findings may further modify theories.

The great body of research findings in the field of lifespan human development has been organized into several theoretical perspectives to explain how we change throughout our lives. Given the myriad ways in which we develop, theories vary in their explanatory

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**theory** An organized set of observations to describe, explain, and predict a phenomenon.

**hypothesis** A proposed explanation for a phenomenon that can be tested.
focus and emphasis. For example, some theories examine personality development and others address changes in how individuals reason and solve problems. As the following sections illustrate, these theoretical perspectives vary greatly in how they account for the developmental changes that occur over the lifespan.

**PSYCHOANALYTIC THEORIES**

Are there powerful forces within us that make us behave as we do? Are we pushed by inner drives? Psychoanalytic theories describe development and behavior as a result of the interplay of inner drives, memories, and conflicts we are unaware of and cannot control. These inner forces influence our behavior throughout our lives. Freud and Erikson are two key psychoanalytic theorists whose theories remain influential today.

**Freud's Psychosexual Theory**

Sigmund Freud (1856–1939), a Viennese physician, is credited as the father of the psychoanalytic perspective. Freud believed that much of our behavior is driven by unconscious impulses. Psychoanalytic theory is a perspective introduced by Freud that development and behavior is stagelike and influenced by inner drives, memories, and conflicts of which an individual is unaware and cannot control.

**TABLE 1.2 • Freud's Psychosexual Stages**

<table>
<thead>
<tr>
<th>STAGE</th>
<th>APPROXIMATE AGE</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>Oral</td>
<td>0 to 18 months</td>
<td>Basic drives focus on the mouth, tongue, and gums, whereby the infant obtains pleasure by feeding and sucking. Feeding and weaning are particularly important influences on personality development at this time. Failure to meet oral needs can be shown in behaviors that center on the mouth, such as fingernail biting, overeating, smoking, or excessive drinking.</td>
</tr>
<tr>
<td>Anal</td>
<td>18 months to 3 years</td>
<td>Basic drives are oriented toward the anus, and the infant obtains pleasure by retaining or passing of bowel and bladder movements. Toilet training is an important influence on personality development. If caregivers are too demanding, pushing the child before he or she is ready, or if caregivers are too lax, children may develop issues of control such as a need to impose extreme order and cleanliness on their environment or extreme messiness and disorder.</td>
</tr>
<tr>
<td>Phallic</td>
<td>3 to 6 years</td>
<td>Basic drives shift to the genitals. The child develops a romantic desire for the opposite-sex parent and a sense of hostility and/or fear of the same-sex parent. The conflict between the child's desires and fears arouses anxiety and discomfort. It is resolved by pushing the desires into the unconscious and spending time with the same-sex parent and adopting his or her behaviors and roles. It is through this process that children begin to become members of society by adopting societal expectations and values. Failure to resolve this conflict may result in guilt and a lack of conscience.</td>
</tr>
<tr>
<td>Latency</td>
<td>6 years to puberty</td>
<td>This is not a stage but a time of calm between stages when the child develops talents and skills and focuses on school, sports, and friendships.</td>
</tr>
<tr>
<td>Genital</td>
<td>Puberty to adulthood</td>
<td>With the physical changes of early adolescence, the basic drives again become oriented toward the genitals. The person becomes concerned with developing mature adult sexual interests and sexual satisfaction in adult relationships throughout life.</td>
</tr>
</tbody>
</table>
unconscious impulses that are outside of our awareness. As shown in Table 1.2, Freud believed we progress through a series of psychosexual stages, periods in which unconscious drives are focused on different parts of the body, making stimulation to those parts a source of pleasure. How parents direct and gratify their children’s basic drives influences their personality development. Freud explained that the task for parents is to strike a balance between over- and under-gratifying a child’s needs at each stage in order to help the child develop a healthy personality with the capacity for mature relationships throughout life.

Freud made many contributions to psychology, psychiatry, and Western thought. Many of his insights have stood up well to the test of time, such as the notion of unconscious processes that we are not aware of (Adolph & Berger, 2005; Bargh, 2013; Fonagy & Target, 2000). The idea that early experiences in the family are important contributors to development is also accepted by the general public, as is the role of emotions in development, both of which Freud espoused. However, Freud did not study children; his theory grew from his work with female psychotherapy patients. Because of its heavy emphasis on infant sexuality, Freud’s psychosexual stage framework, especially the phallic stage, is not widely accepted (Westen, 1998).

Freud’s theory has declined in popularity, partly because it cannot be directly tested and is therefore not supported by research (Crews, 1996). How are we to study unconscious drives when we are not aware of them? Only about 2% of today’s psychotherapists practice traditional Freudian psychoanalysis that emphasizes unconscious motivators of behavior because shorter and more behaviorally focused therapies have been found to be more effective at helping people (Leichsenring & Rabung, 2008; McDonald, 1998).

**Erikson’s Psychosocial Theory**

Erik Erikson (1902–1994) was influenced by Freud, but he placed less emphasis on instinctual drives as motivators of development and instead focused on the role of the social world, society, and culture in shaping development. Erikson posed a lifespan theory of development in which individuals progress through eight stages of psychosocial development that include changes in how they understand and interact with others, as well as changes in how they understand themselves and their roles as members of society (Erikson, 1950; see Table 1.3). Each stage presents a unique developmental task, which Erikson referred to as a crisis or conflict that must be resolved. How well individuals address the crisis determines their ability to deal with the demands made by the next stage of development.

Regardless of their success in resolving a crisis of a given stage, individuals are driven by biological maturation and social expectations to the next psychosocial stage. No crisis is ever fully resolved, and unresolved crises are revisited throughout life. Although Erikson believed that it is never too late to resolve a crisis, resolving a crisis from a previous stage may become more challenging over time as people focus on current demands and the crises of their psychosocial stages.

Erikson’s psychosocial theory is well regarded as one of the first lifespan views of development. He took a positive view of development and included the role of society and culture by basing his theory on a broad range of cases including larger and more diverse samples than did Freud (Thomas, 2004). Erikson’s theory is criticized as difficult to test, but it has nonetheless sparked research on specific stages, most notably on the development of identity during adolescence and the drive to guide youth and contribute to the next generation during middle adulthood (Crain, 2011; Miller, 2016).
Because Erikson’s lifespan theory of development holds implications for every period of life, we will revisit his theory throughout this book at each period in the lifespan: infancy, childhood, adolescence, adulthood, and old age.

**Behaviorist and Social Learning Theories**

In response to psychoanalytic theorists’ emphasis on the psyche as an invisible influence on development and behavior, some scientists pointed to the importance of studying observable behavior rather than thoughts and emotion, which cannot be seen or objectively verified. Theorists who study behaviorism examine only behavior that can be observed and believe that all behavior is influenced by the physical and social environment. For example, consider this famous quote from John Watson, an early founder of behaviorism:

> Give me a dozen healthy infants, well formed, and my own specified world to bring them up in and I’ll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant, chief, and yes, even beggar-man and thief, regardless of his talents, inclinations, abilities, vocations, and race of his ancestors. (Watson, 1925, p. 82)

**TABLE 1.3 • Erikson’s Psychosocial Stages of Development**

<table>
<thead>
<tr>
<th>STAGE</th>
<th>APPROXIMATE AGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust vs. mistrust</td>
<td>Birth to 1 year</td>
<td>Infants learn to trust that others will fulfill their basic needs (nourishment, warmth, comfort) or to lack confidence that their needs will be met.</td>
</tr>
<tr>
<td>Autonomy vs. shame and doubt</td>
<td>1 to 3 years</td>
<td>Toddlers learn to be self-sufficient and independent through toilet training, feeding, walking, talking, and exploring, or they lack confidence in their own abilities and doubt themselves.</td>
</tr>
<tr>
<td>Initiative vs. guilt</td>
<td>3 to 6 years</td>
<td>Young children become inquisitive, ambitious, and eager for responsibility, or they experience overwhelming guilt for their curiosity and overstepping boundaries.</td>
</tr>
<tr>
<td>Industry vs. inferiority</td>
<td>6 to 12 years</td>
<td>Children learn to be hard working, competent, and productive by mastering new skills in school, friendships, and home life, or they experience difficulty, leading to feelings of inadequacy and incompetence.</td>
</tr>
<tr>
<td>Identity vs. role confusion</td>
<td>Puberty to early adulthood</td>
<td>Adolescents search for a sense of self by experimenting with roles. They also look for answers to the question, “Who am I?” in terms of career, sexual, and political roles, or they remain confused about who they are and their place in the world.</td>
</tr>
<tr>
<td>Intimacy vs. isolation</td>
<td>Early adulthood</td>
<td>Young adults seek companionship and close relationship with another person, or they experience isolation and self-absorption due to difficulty developing intimate relationships and sharing with others.</td>
</tr>
<tr>
<td>Generativity vs. stagnation</td>
<td>Middle adulthood</td>
<td>Adults contribute to, establish, and guide the next generation through work, creative activities, and parenting, or they stagnate, remaining emotionally impoverished and concerned about themselves.</td>
</tr>
<tr>
<td>Integrity vs. despair</td>
<td>Late adulthood</td>
<td>Older adults look back at life to make sense of it, accept mistakes, and view life as meaningful and productive, or they feel despair over goals never reached and fear of death.</td>
</tr>
</tbody>
</table>
By controlling an infant's physical and social environment, Watson believed he could control the child's destiny. Behaviorist theory is also known as *learning theory* because it emphasizes how people and animals learn new behaviors as a function of their environment. As discussed in the following sections, classical and operant conditioning are two forms of behaviorist learning; social learning integrates elements of behaviorist theory and information processing theories.

**Classical Conditioning**

Classical conditioning is a form of learning in which the person or animal comes to associate environmental stimuli with physiological responses. Ivan Pavlov (1849–1936), a Russian physiologist, discovered classical conditioning when he noticed that dogs naturally salivate when they taste food, but they also salivate in response to various sights and sounds that they associate with food.

![Classical Conditioning in a Newborn](image)

Ivan Pavlov (1849–1936) discovered classical conditioning when he noticed that dogs naturally salivate when they taste food, but they also salivate in response to various sights and sounds that they associate with food.

**Operant Conditioning**

Perhaps it is human nature to notice that the consequences of our behavior influence our future behavior. A teenager who arrives home after curfew and is greeted with a severe scolding may be less likely to return home late in the future. An employer who brings coffee and muffins to her staff on Monday morning and then notices that her employees are in good spirits and productive may be more likely to bring them snacks in the future. These two examples illustrate the basic tenet of B. F. Skinner's (1905–1990) theory of *operant conditioning*: Behavior becomes more or less probable depending on its consequences. We repeat behaviors that have pleasant outcomes and stop behaviors with unpleasant outcomes. Behaviorist ideas about operant conditioning and the nature of human behavior are woven into the fabric of North American culture and appear often in discussions of parenting (Rutherford, 2000).
According to Skinner, a behavior followed by a rewarding or pleasant outcome, called reinforcement, will be more likely to recur, but one followed by an aversive or unpleasant outcome, called punishment, will be less likely to recur. Operant conditioning is a very important concept because it explains much of human behavior, including how we learn skills and habits.

**Social Learning Theory**

A common criticism of behaviorist theory is its overemphasis on the observable and neglect of internal influences on development and behavior (Miller, 2016). Albert Bandura (b. 1925) agreed that the physical and social environments are important, but he also advocated for the role of thought and emotion as contributors to development. According to Bandura's social learning theory, people actively process information—they think and they feel emotion—and their thoughts and feelings influence their behavior. The physical and social environment influences our behavior through their influence on our thoughts and emotions. For example, the teenager who breaks his curfew and is met by upset parents may experience remorse, feeling bad about his actions, which may then make him less likely to come home late in the future. In this example, the social environment (a discussion with upset parents) influenced the teen's thoughts and emotions (feeling bad for upsetting his parents), which then influenced the teen's behavior (not breaking curfew in the future). In this way, our thoughts and emotions about the consequences of our behavior influence our future behavior. We do not need to experience punishment or reinforcement in order to change our behavior (Bandura, 2001). We can learn by thinking about the potential consequences of our actions.

One of Bandura's most enduring ideas about development is that people learn through observing and imitating models, which he referred to as observational learning (Bandura, Ross, & Ross, 1963; Bandura, 1986). People learn by watching others. This finding suggests that children who observe violence rewarded, such as a child grabbing (and successfully obtaining) another child's toy, may imitate what they see and use aggressive means to take other children's toys. People also learn by observing the consequences of others' actions. A child observer might be less likely to imitate a child who takes another child's toy if the aggressor is scolded by a teacher and placed in time out. Observational learning, learning by watching and imitating others around us, is one of the most powerful ways in which we learn.

Another of Bandura’s contributions that has influenced the field of lifespan human development is the concept of reciprocal determinism, according to which individuals and the environment interact and influence each other (Bandura, 2011, 2012). In contrast with behaviorist theorists, Bandura viewed individuals as active in their development rather than passively molded by their physical and social environment. Individuals can influence and change their physical and social surroundings. Specifically, development is a result of interactions between the individual's characteristics, his or her behavior, and the physical and social environment (see Figure 1.5).

As an example, let us examine how characteristics of a given person might influence that person's behavior and the surrounding social environment. Suppose Isaac is an excitable person, and his excitability makes him quick to debate with others. This behavioral tendency, in turn, stimulates others around him to engage in debate. In addition to Isaac's characteristics, his behavior (being quick to debate) also is
influenced by the environment (e.g., being surrounded by smart people who enjoy debating) and influences the environment (e.g., people who enjoy debating are more likely to talk to Isaac, while people who avoid debating are less likely to talk to him). This is an example of the complex interplay between person, behavior, and physical and social environment that underlies much of what we will discuss throughout this book.

Behaviorist theories make important contributions to understanding lifespan human development. Classical and operant conditioning and social learning are powerful means of explaining human behavior at all ages. Concepts such as observational learning, reinforcement, and punishment hold implications for parents, teachers, and anyone who works with people. Moreover, social learning theory and reciprocal determinism offer a more complex explanation for development and behavior than do behaviorist theories. We will revisit these concepts throughout this book.

Cognitive Theories
According to the lifespan developmental perspective, there are multiple domains of development. We grow and change in many ways over our lifetime. Whereas psychoanalytic theories examine inner influences on our personality and behavior, and behaviorist and social learning theories look to the environment as an influence on development, cognitive theorists examine the role of thought on behavior. Cognitive-developmental theory and information processing theorists view cognition—thought—as essential in understanding people's functioning across the lifespan.

Piaget's Cognitive-Developmental Theory
Do infants think? How do children understand physical phenomena, such as whether a ball of modeling clay changes in mass when it is rolled into the shape of a hot dog? As the first scientist to systematically examine children's thinking and reasoning, Swiss scholar Jean Piaget (1896–1980) believed that in order to understand children we must understand how they think because thinking influences all of behavior. Piaget founded the cognitive-developmental perspective on child development, which views children and adults as active explorers of their world, learning by interacting with the world around them, and organizing what they learn into cognitive schemas, or concepts, ideas, and ways of interacting on the world. In this way people contribute to their own cognitive development because they are biologically driven to interact with others and through these interactions they construct and refine their own cognitive schemas.

Piaget proposed that children's drive to explore and understand the world propels them through four stages of cognitive development. With each advancing stage, people create and use more sophisticated cognitive schemas so that they think, reason, and understand their world in more complex ways. As shown in Table 1.4, individuals move from understanding...
the world through their senses and motor skills, to a thought-based understanding, to viewing the world in logical but concrete terms, to viewing it in complex and abstract forms. Each stage corresponds to a different period in life. We will discuss each stage in further detail in Chapter 6.

Piaget’s cognitive-developmental theory transformed the field of developmental psychology and remains one of the most widely cited developmental theories (Lourenco & Machado, 1996). It was the first to consider how infants and children think and to view people as active contributors to their development. Piaget’s concept of cognitive stages and the suggestion that children’s reasoning is limited by their stage holds implications for education—specifically the idea that effective instruction must match the child’s developmental level.

Some critics of cognitive-developmental theory argue that Piaget focused too heavily on cognition and ignored emotional and social factors in development (Broughton, 1981; Winegar & Valsiner, 1992). Others believe that Piaget neglected the influence of contextual factors by assuming that cognitive-developmental stages are universal, that all individuals everywhere progress through the stages in a sequence that does not vary (Lutz & Sternberg, 1999). Some cognitive theorists disagree with Piaget and argue that cognitive development is not a discontinuous, stage-like process; instead, it is a continuous process, as described in the following section.

### Information Processing Theory

A developmental scientist presents a 5-year-old child with a puzzle in which a dog, cat, and mouse must find their way to a bone, piece of fish, and hunk of cheese (Klahr, 1985). To solve the puzzle, the child must move all three animals to the appropriate locations. How will the child approach this task? Which item will she move first? What steps will she take? Will the child keep all three animals in mind? Will she remember the task and show what item goes with each animal? How quickly will the child respond? What strategies will she use? What factors influence whether and how quickly a child completes this task? Finally, how does the 5-year-old child’s process and performance differ from that of children older and younger than herself?

The problem described above illustrates the questions studied by developmental scientists who favor **information processing theory**, a perspective that views thinking as information processing and posits that the mind works in ways similar to a computer because information enters, is manipulated, stored, recalled, and used to solve problems.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>APPROXIMATE AGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensorimotor</td>
<td>Birth to 2 years</td>
<td>Infants understand the world and think using only their senses and motor skills, by watching, listening, touching, and tasting.</td>
</tr>
<tr>
<td>Preoperational</td>
<td>2 to 6 years</td>
<td>Preschoolers are able to explore the world using their own thoughts as guides and develop the language skills to communicate their thoughts to others. Despite these advances, their thinking is characterized by several errors in logic.</td>
</tr>
<tr>
<td>Concrete operational</td>
<td>7 to 11 years</td>
<td>School-aged children become able to solve everyday logic problems. Their thinking is not yet fully mature because they are able to apply their thinking only to problems that are tangible and tied to specific substances.</td>
</tr>
<tr>
<td>Formal operational</td>
<td>12 years to adulthood</td>
<td>Adolescents and adults can reason logically and abstractly about possibilities, imagined instances and events, and hypothetical concepts.</td>
</tr>
</tbody>
</table>

**TABLE 1.4 • Piaget’s Stages of Cognitive Development**

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Part I  ||  Foundations of Development

(Halford & Andrews, 2011; Klahr, 1992). Unlike the theories we have discussed thus far, information processing theory is not one theory that is attributed to an individual theorist. Instead there are many information processing theories, and each emphasizes a different aspect of thinking. Some theories focus on how people perceive, focus on, and take in information. Others examine how people store information, create memories, and how they remember information. Still others examine problem solving—how people approach and solve problems in school, the workplace, and everyday life.

According to information processing theorists, we are born with the ability to process information. Our mind itself and its processes of noticing, taking in, manipulating, storing, and retrieving information does not show the radical changes that are associated with stage theories. Instead, from an information processing perspective, development is continuous and entails changes in the efficiency and speed with which we think. Maturation of the brain and nervous system contributes to changes in our information processing abilities, our tendency to become more efficient at processing information over the childhood years and to slow over the adult years (Kail, 2003; Luna, Garver, Urban, Lazar, & Sweeney, 2004). Experience and interaction with others also contributes by helping us learn new ways of managing and manipulating information. Over the childhood years, we become better able to attend to and store information, and we operate on the information we have stored with a greater repertoire of strategies and greater efficiency.

Information processing theory offers a complex and detailed view of how we think, which permits scientists to make specific predictions about behavior and performance that can be tested in research studies. Information processing theory has generated a great many research studies and has garnered much empirical support (Halford & Andrews, 2011). Critics of the information processing perspective argue that a computer model cannot capture the complexity of the human mind and people's unique cognitive abilities. In addition, findings from laboratory research may not extend to the everyday contexts in which people adapt to changing circumstances in contexts that pose great challenges to attention and require flexibility (Miller, 2009). Because findings from information processing research are fundamental to any discussion of cognitive development, we will explore the research in information processing as we discuss each age period throughout this book.

**SOCIOCULTURAL SYSTEMS THEORY**

A major tenet of lifespan development is that people play an active role in their development by interacting with the world around them. Sociocultural systems theories emphasize the role of the sociocultural context in development. People of all ages are immersed in their social contexts; they are inseparable from the cultural beliefs and societal, neighborhood, and familial contexts in which they live. The origins of sociocultural systems theory lie with two theorists, Lev Vygotsky and Urie Bronfenbrenner.

**Vygotsky's Sociocultural Theory**

Writing at the same time as Piaget, Russian scholar Lev Vygotsky (1896–1934) offered a different perspective on development that emphasized the importance of culture. As illustrated in Cultural Influences on Development: Defining Culture, *culture* refers to the beliefs, values, customs and skills of a group. Vygotsky’s (1978) sociocultural theory examines how culture is transmitted from one generation to the next through social interaction. Children interact with adults and more experienced peers as they talk, play, and work alongside them. It is through these formal and informal social contacts that children learn about their culture and what it means to belong to it. By participating in cooperative dialogues and receiving guidance from adults and more expert peers, children adopt their culture's perspectives and practices, learning to think and behave as members of their society (Rogoff, 2003, 2016). As children acquire their culture's patterns of thought and
behavior, they are able to apply these skills and ways of thinking to guide their own actions, thus requiring less assistance from adults and peers (Rogoff, Mosier, Mistry, & Gönçü, 1993; Winsler, Carlton, & Barry, 2000).

Vygotsky’s sociocultural theory holds important implications for understanding cognitive development. Like Piaget, Vygotsky emphasized that children are active in their development by engaging with the world around them. However, Vygotsky also viewed cognitive development as a social process that relies on interactions with adults, more mature peers, and other members of society. Children engage their social world, and the social world shapes development by transmitting culturally relevant ways of thinking and acting. Vygotsky also argued that acquiring language is a particularly important milestone for children because it enables them to think in new ways and have more sophisticated dialogues with others in their culture, advancing their learning about culturally valued perspectives and activities (Vygotsky, 1962). We will revisit Vygotsky’s ideas about the roles of culture, language, and thought in Chapter 6.

Vygotsky’s sociocultural theory is an important addition to the field of lifespan human development because it is the first theory to emphasize the role of the cultural context in influencing people’s development throughout life. Critics argue that sociocultural theory overemphasizes the role of context, minimizes the role of individuals in their own development, and neglects the influence of genetic and biological factors (Wertsch, 1998). Another perspective on cognitive development, described below, refocuses attention on the individual.

**Bronfenbrenner’s Bioecological Systems Theory**

Similar to other developmental theorists, Urie Bronfenbrenner (1917–2005) believed that we are active in our development and interact with the world around us. Specifically, Bronfenbrenner’s **bioecological systems theory** posits that development is a result of the ongoing interactions among biological, cognitive, and psychological changes within the person and his or her changing context (Bronfenbrenner & Morris, 2006; Bronfenbrenner, 1979, 2005). Bronfenbrenner proposed that individuals are all embedded in, or surrounded by, a series of contexts: home, school, neighborhood, culture, and society. The bioecological systems theory offers a comprehensive perspective on the role of context as an influence on development. As shown in Figure 1.6, contexts are organized into a series of systems in which individuals are embedded and that interact with one another and the person to influence development.

At the center of the bioecological model is the individual. The developing person’s genetic, psychological, socioemotional, and personality traits interact, influencing each other. For example, biological development, such as brain maturation, may influence cognitive development, which in turn might influence social development, such as a child’s understanding of friendship. Social development then may influence cognitive development, as children may learn activities or ideas from each other. In this way the various forms of development interact. The individual interacts with the contexts in which he or she is embedded, influencing and being influenced by them (Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 2006).

The individual is embedded in the innermost level of context, the **microsystem**, which includes the immediate physical and social environment surrounding the person, such as family, peers, and school. The individual interacts with elements of the microsystem by, for example, developing relationships with peers in which peers influence the person and vice versa. Because the microsystem contains the developing person, it has an immediate and direct influence on his or her development. Peer relationships can influence a person’s sense of self-esteem, social skills, and emotional development.

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**bioecological systems theory** A theory introduced by Bronfenbrenner that emphasizes the role of context in development, positing that contexts are organized into a series of systems in which individuals are embedded and that interact with one another and the person to influence development.

**microsystem** In bioecological systems theory, the innermost level of context, which includes an individual’s immediate physical and social environment.
Bronfenbrenner’s next level, the **mesosystem**, refers to the relations and interactions among microsystems, or connections among contexts. For example, experiences in the home (one microsystem) influence those at school (another microsystem); parents who encourage and provide support for reading will influence the child’s experiences in the classroom. Like the microsystem, the mesosystem has a direct influence on the individual because he or she is a participant in it.

An important contribution of bioecological theory is the role of the **exosystem**, which consists of other settings in which the individual is not a participant but that nevertheless influence him or her. For example, a child typically does not participate in a parent’s work setting, yet the work setting has an indirect influence on the child because it affects the parent’s mood. The availability of funding for schools, another exosystem factor, indirectly affects children by influencing the availability of classroom resources. The exosystem is an important contribution to our understanding of development because the effects of outside factors trickle down and indirectly affect children and adults.
The macrosystem is the greater sociocultural context in which the microsystem, mesosystem, and exosystem are embedded. It includes cultural values, legal and political practices, and other elements of the society at large. The macrosystem indirectly influences the child because it affects each of the other contextual levels. For example, cultural beliefs about the value of education (macrosystem) influence funding decisions made at national and local levels (exosystem), as well as what happens in the classroom and in the home (mesosystem and microsystem). Lives in Context: Sociohistorical Influences on Development illustrates how one element of the macrosystem, historical events, may influence development.

A final element of the bioecological system is the chronosystem, which refers to how the bioecological system changes over time. As people grow and change, they take on and let go of various roles. For example, graduating from college, getting married, and becoming a parent involve changes in roles and shifts in microsystems. These shifts in contexts, called ecological transitions, occur throughout life. The complexity of the bioecological model, the attention to patterns and interrelations among multiple determinants of development, is both a strength and weakness of the theory (Darling, 2007; Dixon & Lerner, 1999). Human development is complex, and only when we consider the multiple interacting influences within the individual and context will we gain insight into the processes and outcomes of developmental change. However, we can never measure and account for all of the potential influences on development at once. Therefore, it is difficult to devise research studies to test the validity of the bioecological model. Despite this, bioecological theory remains an important contribution toward explaining developmental change across the lifespan.

**ETHOLOGY AND EVOLUTIONARY DEVELOPMENTAL THEORY**

Why do infants bond to their parents? Are parents innately attuned to their infants? How might attachments between infants and parents contribute to infants’ development? Some theorists argue that parenting is innate and has survival value. In 1859, Charles Darwin proposed his theory of evolution, explaining that all species adapt and evolve over time. Specifically, traits that enable a species to adapt, thrive, and mate tend to be passed to succeeding generations because they improve the likelihood of the individual’s and species’ survival. Ethology is the scientific study of the evolutionary history of behavior and its survival value (Dewsbury, 1992). Konrad Lorenz and Kiko Tinbergen, two European zoologists, observed animal species in their natural environments and noticed patterns of behavior that appeared to be inborn, emerged early in life, and ensured their survival. For example, shortly after birth, goslings imprint on their mothers, meaning that they bond to her and will follow her, thereby ensuring they stay close to the mother, get fed, and remain protected. Imprinting ensures the goslings’ survival. In order for imprinting to occur, the mother goose must be present immediately after the goslings hatch; mothers instinctively stay close to the nest so that their young may imprint and enhance their odds of surviving (Lorenz, 1952).

According to Bowlby (1969), humans also display biologically preprogrammed behaviors that have survival value and promote development. For example, caregivers naturally respond to infants’ cues. Crying, smiling, and grasping are inborn ways that infants get attention from caregivers, bringing them physical contact and ensuring that the infants will be safe and cared for. Many infant behaviors have adaptive significance because they meet infants’ needs and promote the formation of bonds with caregivers, ensuring that the caregivers will feel a strong desire and obligation to care for them (Bowlby, 1973). In this way infant biological drives and behaviors work together with experience to influence adaptation and ultimately an individual’s survival.

Are you—your abilities, personality, and competencies—a result of your genes and inborn influences? Or did the physical and social environment in which you were...
The children experienced economic scarcity and family discord during the Great Depression. The Oakland cohort tended to behave responsibly and assist their families in coping. The boys often assumed jobs outside the home to aid financially troubled families. Their activities outside the home enhanced their social independence and reduced their exposure to family stress. Girls spent more time at home caring for siblings and completing household chores as many mothers worked outside the home; they were exposed to greater amounts of family stress and showed poorer adjustment than did the boys.

The Berkeley children, the younger cohort, experienced the Great Depression during their vulnerable early childhood years. The children experienced economic scarcity and family discord early in life, at a time when they were very dependent on family. The Berkeley cohort entered adolescence during World War II, a period of additional economic and emotional stress from empty households (as both parents worked to support the war effort) and the military service and war trauma of older brothers. As adolescents, the Berkeley cohort (especially the boys) experienced greater emotional difficulties, more poor attitudes toward school, and less hope, self-direction, and confidence about their future than did the Oakland cohort (who were children during the prosperous 1920s).

However, the Berkeley cohort demonstrated resilience in adulthood, largely because of the influence of military service. Seventy percent of the males in the Berkeley sample served in the military during World War II. Military service appeared to offer the men several opportunities, such as to begin again and reconsider their lives, to travel, and access to the GI Bill of Rights, which enabled them to expand their education and acquire new skills after the war. These two cohorts of young people offer striking examples of how sociohistorical context influences development. Context always plays a role in development—not only in times of social upheaval, but every day and for every generation of people.

What Do You Think?

1. Consider the sociohistorical context in which you were raised. What historical and societal events may have influenced you? What events have shaped your generation’s childhood and adolescence?

2. Consider the societal and cultural events that your parents may have experienced in childhood and adolescence. What technology was available? What historical events did they experience? What were the popular fads of their youth? What influence do you think these sociohistorical factors may have had on your parents’ development?

3. Compare the sociohistorical context in which you are embedded today with that of your parents and grandparents at your age.
raised, your family, friends, and school make you who you are today? Evolutionary developmental scientists explain that these are the wrong questions to ask. **Evolutionary developmental theory** applies principles of evolution and scientific knowledge about the interactive influence of genetic and environmental mechanisms to understand the changes people undergo throughout their lives. From this perspective, genes and context interact in an ever-changing way so that it is impossible to isolate the contributions of each to development (Gottesman & Hanson, 2005; Gottlieb, 2003; LaFreniere & MacDonald, 2013; Lickliter & Honeycutt, 2003). Although all of our traits and characteristics are influenced by genes, contextual factors influence the expression of genetic instructions, as illustrated by Figure 1.7. Contextual factors such as gravity, light, temperature, and moisture influence how genes are expressed and therefore how individuals develop (Gilbert, 2001; Meaney, 2010; Rutter, 2010). For example, in crocodiles, sex is determined by the temperature in which the organism develops. Eggs incubated at one range of temperatures produce male crocodiles and at another temperature produce female crocodiles (Gans & Crews, 1992).

According to evolutionary developmental theory, genetic programs and biological predispositions interact with the physical and social environment to influence development and Darwinian natural selection determines what genes and traits are passed on to the next generation (Bjorklund & Pellegrini, 2000; Krebs, 2003; Lickliter & Honeycutt, 2003). People are viewed as active in their development, influencing their contexts (through their genetic characteristics and by choosing and interacting within settings), responding to the demands for adaptation posed by their contexts, and constantly interacting with and adapting to the world around them. The relevance of both biological and contextual factors to human development is indisputable and most developmental scientists appreciate the contributions of evolutionary developmental theory (Frankenhuis, Panchanathan, & Clark Barrett, 2013; Gottlieb, Wahlsten, & Lickliter, 1998; Lickliter & Honeycutt, 2013). The ways in which biology and context interact and their influence on development changes over the course of the lifetime, as we will discuss throughout this book.

In summary, there are many theories of human development that offer complementary and contrasting views of how we change throughout our lifetimes. Psychoanalytic theories emphasize personality change—how unconscious forces shape people (Freud) and how sociocultural forces influence ego development (Erikson). Behaviorist and social learning theories point to the physical and social environment as a shaper of development and behavior, as well as the role of observation and imitation in learning. Other theories emphasize cognitive development. Piaget's cognitive-developmental theory explains how individuals construct their own knowledge structures through interaction with the world, whereas Vygotsky emphasizes the role of sociocultural context in influencing thought. Information processing theories examine the ways in which attention, processing speed, and strategy use lead to advances in thinking and problem solving ability. Finally, Bronfenbrenner's biocultural theory takes a comprehensive look at the many contextual systems in which people live and how people and their contexts interact. Table 1.5 provides an at-a-glance comparison of theories of human development.
### TABLE 1.5 • Comparing Theories of Human Development

<table>
<thead>
<tr>
<th>Theory</th>
<th>Continuity vs. Discontinuity</th>
<th>Active vs. Passive Individual</th>
<th>Nature vs. Nurture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freud’s psychosexual theory</td>
<td>Discontinuous stages</td>
<td>Passive individuals are motivated by inborn basic drives.</td>
<td>Greater emphasis on nature: People are driven by inborn drives, but the extent to which the drives are satisfied influences developmental outcomes.</td>
</tr>
<tr>
<td>Erikson’s psychosocial theory</td>
<td>Discontinuous stages</td>
<td>Active individuals interact with their social world to resolve psychosocial tasks.</td>
<td>Both nature and nurture: Biological and social forces propel people through the stages and social and psychosocial influences determine the outcome of each stage.</td>
</tr>
<tr>
<td>Behaviorist theory</td>
<td>Continuous process of learning new behaviors</td>
<td>Passive individuals are shaped by their environment.</td>
<td>Nurture: Environmental influences shape behavior.</td>
</tr>
<tr>
<td>Bandura’s social learning theory</td>
<td>Continuous process of learning new behaviors</td>
<td>Individuals’ characteristics and behavior interact with the environment.</td>
<td>Both nature and nurture: Inborn characteristics and the physical and social environment influence behavior.</td>
</tr>
<tr>
<td>Piaget’s cognitive-developmental theory</td>
<td>Discontinuous stages, but also continuous process of seeking equilibration</td>
<td>Active individuals interact with the world to create their own schemas.</td>
<td>Both nature and nurture: An innate drive to learn coupled with brain development leads people to interact with the world. Opportunities provided by the physical and social environment influence development.</td>
</tr>
<tr>
<td>Vygotsky’s sociocultural theory</td>
<td>Continuous interactions with others lead to developing new reasoning capacities and skills.</td>
<td>Active individuals interact with members of their culture.</td>
<td>Both nature and nurture: People learn through interactions with more skilled members of their culture; however, capacities are influenced by genes, brain development, and maturation.</td>
</tr>
<tr>
<td>Information processing theory</td>
<td>Continuous increase of skills and capacities</td>
<td>Active individuals attend to, process, and store information.</td>
<td>Both nature and nurture: People are born with processing capacities that develop through maturation and environmental influences.</td>
</tr>
<tr>
<td>Bronfenbrenner’s bioecological systems theory</td>
<td>Continuous: People constantly change through their interactions with the contexts in which they are embedded.</td>
<td>Active individuals interact with their contexts, being influenced by their contexts but also determining what kinds of physical and social environments are created and how they change.</td>
<td>Both nature and nurture: People’s inborn and biological characteristics interact with an ever changing context to influence behavior.</td>
</tr>
<tr>
<td>Ethology and evolutionary developmental theory</td>
<td>Both continuous and discontinuous: People gradually grow and change throughout life but there are sensitive periods during which specific experiences and developments must occur.</td>
<td>Active individuals interact with their physical and social environment.</td>
<td>Both nature and nurture: Genetic programs and biological predispositions interact with the physical and social environment to influence development, and Darwinian natural selection determines what genes and traits are passed on to the next generation.</td>
</tr>
</tbody>
</table>
Thinking in Context 1.3

Maria and Fernando have just given birth to their first child, a healthy baby boy. Like most new parents, Maria and Fernando are nervous and overwhelmed with their new responsibilities. Of utmost importance to them is that the baby develop a strong and secure bond to them. They want their baby to feel loved and to love them.

1. What advice would a psychoanalytic theorist give Maria and Fernando? Contrast psychoanalytic with behaviorist perspectives. How might a behaviorist theorist approach this question?

2. How might an evolutionary developmental theorist explain bonding between parents and infants? What advice might an evolutionary developmental theorist give to Maria and Fernando?

3. Considering bioecological systems theory, what microsystem and mesosystem factors influence the parent–child bond? What role might exosystem and macrosystem factors take?

Research in Human Development

LO 1.4 Describe the methods used in studying human development, including types of data and designs.

The many theories of lifespan human development differ in focus and explanation, but they all are the result of scientists' attempts to organize observations of people at all ages. Developmental scientists conduct research studies to gather information and answer questions about how people grow and change over their lives. They devise theories to organize what they learn from research and to suggest new hypotheses to test in research studies. In turn, research findings are used to modify theories. By conducting multiple studies over time, developmental scientists refine their theories about lifespan human development and determine new questions to ask. Developmental science also finds significant influences in contexts, as discussed in Applying Developmental Science.

The Scientific Method

Researchers employ the scientific method, a process of posing and answering questions by making careful and systematic observations and gathering information. The scientific method provides an organized way of formulating questions, finding answers, and communicating research discoveries. Its basic steps are as follows:

1. Identify the research question or problem to be studied and formulate the hypothesis, or proposed explanation, to be tested.

2. Gather information to address the research question.

3. Summarize the information gathered and determine whether the hypothesis is refuted, or shown to be false.

4. Interpret the summarized information, consider the findings in light of prior research studies, and share findings with the scientific community and world at large.

In practice, the scientific method usually does not proceed in such a straightforward, linear fashion. Frequently research studies raise as many questions as they answer—and sometimes more. Unexpected findings can prompt new studies. For example, researchers...
The Importance of Context in Developmental Science

In its early years, the study of human development was based in laboratory research devoted to uncovering universal aspects of development by stripping away contextual influences (Wertlieb, 2003). This basic research was designed to examine universal processes that apply to all people, such as perceptual development (e.g., what visual skills are infants born with?).

As developmental scientists began apply their knowledge outside of laboratory settings, however, it became apparent that there are a great many individual differences in development. Developmental scientists have since realized the importance of context. The field of applied developmental science has emerged, studying individuals within the contexts in which they live. This approach promotes the ability to understand the diverse range of patterns development takes throughout the life course (Lerner, 2010; Wertlieb, 2003).

Research in human development is now directed toward understanding a variety of social problems and issues of immediate social relevance, such as the capacities of preterm infants, children’s ability to provide eyewitness testimony, adolescent sexual practices, and the impact of disability on the psychological and social adjustment of older adults and their adult children (Fisher, Busch-Rossnagel, Jopp, & Brown, 2013; Lerner, 2012). Applying developmental scientists study and make contributions to social policies on issues that affect children, adolescents, adults, and their families, including environmental quality, health and health care delivery, violence, hunger and poor nutrition, school failure, and pervasive poverty (Tseng, 2012). Developmental scientists seek to enhance the life chances of diverse groups of individuals, families, and communities. Throughout this book you will be introduced to these and more issues studied by applying developmental scientists.

What Do You Think?
1. Identify three areas that you believe are in need of study or intervention by developmental scientists.
2. What are some challenges faced by children, adolescents, or adults that you believe should be studied and addressed?

Methods of Data Collection

The basic challenge that scientists face in conducting research is determining what information is important and how to gather it. Scientists use the term data to refer to the information they collect. How can we gather data about children, adolescents, and adults? Should we simply talk with our participants? Watch them as they progress through their days? Hook them up to machines that measure physiological activity such as heart rate or brain waves? Developmental scientists use a variety of different methods, or measures, to collect information.
Self-Report Measures

Interviews and questionnaires are known as self-report measures because the person under study answers questions about his or her experiences, attitudes, opinions, beliefs, and behavior. Interviews can take place in person, over the phone, or over the Internet.

The open-ended interview is very flexible because the trained interviewer uses a conversational style that encourages the participant, or the person under study, to expand his or her responses. Interviewers may vary the order of questions, probe, and ask follow up questions based on responses. The scientist begins with a question and then follows up with prompts to obtain a better view of the person's reasoning (Ginsburg, 1997). An example of this is the Piagetian Clinical Interview, which requires specialized training to administer. Consider this dialogue between Piaget and a 5-year-old child:

Where does the dream come from?
I think you sleep so well that you dream.
Does it come from us or from outside?
From outside.
What do we dream with?
I don't know.
With the hands? With nothing?
Yes, with nothing.
When you are in bed and you dream, where is the dream?
In my bed, under the blanket. I don't really know. If it was in my stomach the bones would be in the way and I shouldn't see it.
Is the dream there when you sleep?
Yes, it is in my bed beside me.
Is the dream in your head?
It is I that am in the dream; it isn't in my head. When you dream, you don't know you are in the bed. You know you are walking. You are in the dream. You are in bed, but you don't know you are. (Piaget, 1929, pp. 97–98)

Open-ended interviews permit participants to explain their thoughts thoroughly and in their own way. This method also enables researchers to gather a large amount of information quickly. However, the flexibility of open-ended interviews poses a challenge: When questions are phrased differently for each person, responses may not capture real differences in how people think about a given topic and instead may reflect differences in how the questions were posed and followed up by the interviewer.

A structured interview poses the same set of questions to each participant in the same way, and therefore is less flexible than open-ended interviews. Because all participants receive the same set of questions, differences in responses are more likely to reflect true differences among participants and not merely differences in the manner of interviewing. For example Evans, Milanak, Medeiros, and Ross (2002) used a structured interview to examine American children's beliefs about magic. Children between the ages of 3 and 8 were asked the following set of questions:

What is magic? Who can do magic?
Is it possible to have special powers? Who has special powers?
Does someone have to learn to do magic? Where have you seen magic?
What are tricks? Who can do tricks? What is the difference between tricks and magic?
How do wishes work? What does it mean to make a wish? Do wishes come true? Who makes wishes come true?

What do you think about Santa Claus/the Tooth Fairy?

What do you think about Monsters? (p. 49)

After compiling and analyzing the children's responses as well as administering several cognitive tasks, Evans and colleagues concluded that even older children, who have the ability to think logically and perform concrete operations, may display magical beliefs.

A questionnaire, also called a survey, is a set of questions, typically multiple choice, that scientists compile and use to collect data from large samples of people. Questionnaires can be administered in person, online, or by telephone, e-mail, or postal mail. Questionnaires are popular data collection methods because they are easy to use and enable scientists to collect information from a large number of people quickly and inexpensively. Scientists who conduct research on sensitive topics, such as sexual interest and experience, often use questionnaires because they can easily be administered anonymously, protecting participants' privacy by not including any identifying information on the survey. For example, the Monitoring the Future Study is an annual survey of 50,000 students in Grades 8, 10, and 12 that collects information about their behaviors, attitudes, and values concerning drug and alcohol use (Miech, Johnston, O'Malley, Bachman, & Schulenberg, 2015). In this example, the survey permits scientists to gather an enormous amount of data yet its anonymity protects the adolescents from the consequences of sharing personal information that they may not otherwise reveal.

Despite their ease of use, self-report measures are not without challenges. Sometimes people give socially desirable answers: They respond in ways they would like themselves to be perceived or believe researchers desire. A college student completing a survey about cheating, for example, might choose answers that do not truly reflect her behavior of sometimes looking at nearby students' papers during examinations, but instead match the person she aspires to be or the behaviors she believes the world values—that is, someone who does not cheat on exams. Self-report data may not always reflect people's true attitudes and behavior. Some argue that we are not always fully aware of our feelings and therefore cannot always provide useful insight into our own thoughts and behavior with the use of self-report measures (Westen, 1998). Whereas interviews and questionnaires measure people's self-reports of their attitudes, beliefs, and behaviors, observational measures examine people in action as they go about their daily lives.

**Observational Measures**

Are you a people watcher? Have you ever sat in a coffee shop or at the student center and observed people interact, rush from place to place, laugh with others, or scowl at their laptops? If so, you have used observational skills that are similar to those used by scientists who conduct research in everyday settings. Observational measures are methods that scientists use to collect and organize information based on watching and monitoring people's behavior. Developmental scientists employ two types of observational measures: naturalistic observation and structured observation.

Scientists who use **naturalistic observation** observe and record behavior in natural, real-world settings. For example Ginsburg, Pappas, and Seo (2001) analyzed videotapes of 4- and 5-year-old children's everyday behavior during free play to determine the extent to which they used mathematical thinking in their play. Naturalistic observation is challenging because one must first decide on an operational definition of the behavior of interest. In this case, many operational definitions were required as Ginsburg and colleagues designed an elaborate coding system to categorize children's behaviors in terms of their mathematical content, location, preferred play objects, peer interaction, and play activity.
Sometimes the presence of an observer causes the person to behave in unnatural ways or ways that are not typical for him or her. This is known as participant reactivity, and it poses a challenge to gathering by naturalistic observation. To minimize the effect that observation might have on the children’s behaviors, Ginsburg and colleagues made video recordings and permitted the children to get used to the video recorder by exposing them to it many times before using it to collect observations. The video recorded observations revealed that children spend a surprising amount of play time (almost 50%) spontaneously engaging in mathematical activities like ordering objects, counting, comparing sizes and quantities, and exploring positions, direction, distances, and patterns. These results suggest that children naturally engage in mathematics-related play and are more competent in mathematics than many adults realize (Ginsburg et al., 2001).

Naturalistic observation permits researchers to observe behaviors in real-world settings and to observe patterns, such as whether a particular event or behavior typically precedes another. Such observations can help researchers determine which behaviors are important to study in the first place. For example, a scientist who studies bullying by observing children’s play may notice that some victims act aggressively before a bullying encounter. The scientist may then decide to examine aggression in victims not only after a bullying incident, but beforehand. Naturalistic observation is a useful way of studying events and behaviors that are common. Some behaviors and events, however, are uncommon or are difficult to observe, such as physical aggression among adults, requiring a researcher to observe for very long periods of time to obtain data on the behavior of interest. For this reason, many researchers make structured observations.

**TABLE 1.6 • Data Collection Methods**

<table>
<thead>
<tr>
<th></th>
<th>ADVANTAGE</th>
<th>DISADVANTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-ended interview</td>
<td>Gathers a large amount of information quickly and inexpensively.</td>
<td>Nonstandardized questions. Characteristics of the interviewer may influence participant responses.</td>
</tr>
<tr>
<td>Structured interview</td>
<td>Permits gathering a large amount of information quickly and inexpensively.</td>
<td>Characteristics of the interviewer may influence participant responses.</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>Permits collecting data from a large sample more quickly and inexpensively than by interview methods.</td>
<td>Some participants may respond in socially desirable or inaccurate ways.</td>
</tr>
<tr>
<td>Naturalistic observation</td>
<td>Gathers data on everyday behavior in a natural environment as behaviors occur.</td>
<td>The observer’s presence may influence the participants’ behavior. No control over the observational environment.</td>
</tr>
<tr>
<td>Structured observation</td>
<td>Observation in a controlled setting.</td>
<td>May not reflect real-life reactions and behavior.</td>
</tr>
<tr>
<td>Physiological measures</td>
<td>Assesses biological indicators and does not rely on participant report.</td>
<td>May be difficult to interpret</td>
</tr>
</tbody>
</table>
Developed in 1971, computerized tomography, known as the CT scan, produces X-ray images of brain structures (Czemialk, 2011). A movable X-ray unit rotates around a person's head and records images of the brain (Herman, 2009). The images are then combined to make a 3-D picture of a person's brain, providing images of bone, brain vasculature, and tissue. CT scans can provide researchers with information about the density of brain structures to illustrate, for example, how the thickness of the cortex changes with development.

Functional magnetic resonance imaging (fMRI) measures brain activity by monitoring changes in blood flow in the brain (Bandettini, 2012). Developed in the 1990s, MRI machines house a powerful magnet that uses radio waves to measure blood oxygen level. Active areas of the brain require more oxygen-rich blood. Like PET scans, fMRI enables researchers to determine what parts of the brain are active as individuals complete cognitive tasks. However, fMRI images are much more detailed than PET scans. An important advantage of fMRI over a PET scan is that it does not rely on radioactive molecules, which can only be administered a few times before becoming unsafe.

Another imaging process, called diffusion tensor imaging (DTI), uses MRI machines to track how water molecules move in and around the fibers connecting different parts of the brain (Sanes, Marques, Alves, & Sousa, 2013). DTI gauges the thickness and density of the brain's connections, permitting researchers to measure the brain's white matter and determine changes that occur with development and with age-related illnesses, such as Alzheimer's disease.

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What Do You Think?

1. If you were going to study the brain, which measure would you choose and why? What type of information would you obtain from your chosen measure?

2. Identify a research question that your measure might help you answer.

Structured observation entails observing and recording behaviors displayed in a controlled environment, which is a situation constructed by the experimenter. For example, children might be observed within a laboratory setting as they play with another child or complete a puzzle-solving task. The challenges of identifying and categorizing which behaviors to record are similar to those entailed by naturalistic observation. However, the laboratory environment permits researchers to exert more control on the situation than is possible in natural settings. In addition to cataloguing observable behaviors, some researchers use technology to measure biological functions such as heart rate, brain waves, and blood pressure. One challenge to conducting structured observations is that people do not always behave in laboratory settings as they do in real life.

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Physiological Measures
Physiological measures are increasingly used in developmental research because cognition, emotion, and behavior have physiological indicators. For example, when speaking in public, such as when you give a class presentation, do you feel your heart beat more rapidly or your palms grow sweaty? An increase in heart rate and perspiration are physiological measures of anxiety. Other researchers might measure cortisol, a hormone triggered by the experience of stress. An advantage of physiological measures is they do not rely on verbal reports and generally cannot be faked. They are also useful for studying infants. A researcher who employs physiological measures might use an infant’s heart rate as a measure of interest or may measure the infant’s eye movement or pupil dilation. A challenge to physiological measures is that, although physiological responses can be recorded, they may be difficult to interpret. For example, excitement and anger may both cause an increase in heart rate. Physiological measures of brain activity are a particularly promising source of data, as discussed in the Lifespan Brain Development feature. Data collection methods are summarized in Table 1.6.

RESEARCH DESIGNS
There are many steps in conducting research. In addition to determining the research question and deciding what information to collect, scientists must choose a research design—a technique for conducting the research study.

Case Study
A case study is an in-depth examination of a single person (or small group of individuals). It is conducted by gathering information from many sources, such as through observations, interviews, and conversations with family, friends, and others who know the individual. A case study may include samples or interpretations of a person’s writing, such as poetry or journal entries, artwork, and other creations. A case study provides a rich description of a person’s life and the influences on his or her development. It is often employed to study individuals who have unique and unusual experiences, abilities, or disorders. Conclusions drawn from a case study may shed light on an individual’s development, but they may not be generalized or applied to others. Case studies can be a source of hypotheses to examine in large scale research.

Correlational Research
Are children with high self-esteem more likely to excel at school? Are older adults with more friends happier than those with few? Are college students who work part-time less likely to graduate? All of these questions can be studied with correlational research, which permits researchers to examine relations among measured characteristics, behaviors, and events. For example, in one study scientists examined the relationship between children’s after-school activities and their academic achievement and found that children who reported watching more television on school nights scored lower on achievement tests (Cooper, Valentine, Nye, & Lindsay, 1999). However, this correlation does not tell us why television viewing was associated with academic achievement. Correlational research cannot answer this question because it simply describes relationships that exist among variables; it does not enable us to make conclusions about the causes of those relationships. It is likely that other variables influence both a child’s television watching and achievement (e.g., motivation), but correlation does not enable us to determine the causes for behavior; for that, we need an experiment.

Experimental Research
Scientists who seek to test hypotheses about causal relationships, such as whether media exposure influences behavior or whether hearing particular types of music influences
mood, employ experimental research. An experiment is a procedure that uses control to determine causal relationships among factors, known as variables. Specifically, one or more variables thought to influence a behavior of interest are changed, or manipulated, while other variables are held constant. By doing so, researchers can examine how the changing variable influences the behavior under study. If the behavior changes as the variable changes, this suggests that the variable caused the change in the behavior.

For example, suppose a scientist examined the influence of exposure to aggressive media on children's aggressive behavior by choosing two cartoons: one containing many aggressive acts (e.g., hitting or punching) and another depicting few aggressive acts (e.g., including themes of sharing). Each child is asked to play with a set of toys containing cars, dolls, and stuffed animals. Researchers observe and record the number of aggressive acts the child engages in, such as hitting and throwing. Each child is tested in the same room, controlling other sounds, the temperature, and time of day of testing. If researchers' ratings of children's aggression change in response to varying the type of media—showing more or less aggressive behavior—then the results suggest a causal relationship: Media exposure changed behavior.

Let us take a closer look at the components of an experiment. Conducting an experiment requires choosing at least one dependent variable, the behavior under study (e.g., hitting and throwing), and one independent variable, the factor proposed to change the behavior under study (e.g., type of cartoon). The independent variable is manipulated or varied systematically by the researcher during the experiment (e.g., a child views many aggressive acts or few aggressive acts). The dependent variable is expected to change as a result of varying the independent variable, and how it changes is thought to depend on how the independent variable is manipulated.

In an experiment, the independent variable is administered to one or more experimental groups, or test groups whose experiences are manipulated by varying the independent variable. The control group is treated just like the experimental group except that it does not receive the independent variable in order to compare the effect of the manipulation. For example, in an experiment investigating whether particular types of music influence mood, the experimental group would experience a change in music (e.g., from "easy listening" to rock), whereas the control would hear only one type of music (e.g., "easy listening"). Random assignment, whereby each participant has an equal chance of being assigned to the experimental or control group, is essential for ensuring that the groups are as equal as possible in all preexisting characteristics (e.g., age, ethnicity, and gender). Random assignment makes it less likely that any observed differences in the outcomes of the experimental and control groups are not due to preexisting differences between the groups. After the independent variable is manipulated, if the experimental and control groups differ on the dependent variable, it is concluded that the independent variable caused the change in the dependent variable. That is, a cause and effect relationship has been demonstrated.

As another example, consider a study designed to examine whether massage therapy improves weight gain in preterm infants (infants who were born well before their due date; Dieter, Field, Hernandez-Reif, Emory, & Redzepi, 2003). Infants housed in a neonatal unit were randomly assigned either to a massage group (independent variable), who were touched and their arms and legs moved for three 15-minute periods per day, or to a control group, which received no massage. Other than the massage/no massage periods, the two groups of

By experimentally manipulating which infants receive massage therapy, researchers determined that massage can help preterm infants gain weight, an important correlate of health.
infants were cared for in the same way. After five days, the preterm infants who received massage therapy gained more weight (dependent variable) than those who did not receive massage therapy. The researchers concluded that massage therapy causes improved weight gain in preterm infants.

Developmental scientists conduct studies that use both correlational and experimental research. Studying development, however, requires that scientists pay close attention to age and how people change over time, which requires the use of specialized research designs, as described in the following sections.

DEVELOPMENTAL RESEARCH DESIGNS

Does personality change over the lifespan? Do children outgrow shyness? Are infants' bonds with their parents associated with their adult relationships? These challenging questions require that developmental scientists examine relationships among variables over time. The following sections discuss the designs that researchers use to learn about human development. As you learn about each design, consider how we might employ it to answer a question about development. For example, how does alcohol use among adolescents change from 6th grade through 12th grade?

Cross-Sectional Research Design

A common way in which developmental scientists examine questions about how variables change with age is to conduct cross-sectional research, comparing groups of people of different ages at one time. For example, to examine how alcohol use changes from 6th through 12th grade, a scientist might visit a school system in 2020 and administer a survey about alcohol use to students in 6th, 8th, 10th, and 12th grades. By analyzing the survey results, the scientist can describe age differences in alcohol use, such as how 6th graders differ from 12th graders. Cross-sectional research permits scientists to draw conclusions about age differences, for example, how the 6th graders differed in alcohol use from the 8th, 10th, and 12th graders. However, it is unknown whether the observed age differences in alcohol use reflect age-related or developmental change. In other words, it is unclear whether 6th graders will show the same pattern of change in alcohol use over the high school years as the 12th graders.

Cross-sectional research gathers information from people of several ages at one time. It permits age comparisons, but because participants differ in terms of age and cohort, it does not permit conclusions about development. Recall that a cohort is a group of people of the same age who are exposed to similar historical events and cultural and societal influences. The 6th-grade students are a different age than the 12th-grade students, but they are also a different cohort in the school, so the two groups may differ in reported alcohol use because of development (age-related changes) or cohort (group-related changes). For example, perhaps the 6th-grade students received a new early prevention program in the school that was not available to the 12th-grade students back when they were in 6th grade. In this example, the difference in alcohol use between 6th graders and 12th graders may be related to the prevention program, not to age. Cross-sectional research is an important source of information about age differences, but it cannot provide information about developmental change.

Longitudinal Research Design

Developmental scientists who study age-related change must examine individuals over time. In longitudinal research, one group of participants is studied at many points in time. To examine how alcohol use changes from 6th through 12th grade, a developmental scientist who used longitudinal research might administer a survey on alcohol use to 6th graders and then follow up 2 years later when they enter 8th grade, again when they...
enter 10th grade, and finally in 12th grade. If a researcher began this study in 2020, the last round of data collection would not occur until 2026. Longitudinal research provides information about age change because it follows people over time, enabling scientists to describe how the 6th graders’ alcohol use changed as they progressed through the school years. However, because longitudinal research studies only one cohort or one generation, it is prone to cohort effects. Do the findings indicate developmental change, or are they an artifact of the cohort under study? Was the group of 6th graders that the scientist chose to follow through 12th grade somehow different from the cohorts or groups of students who came before or after? Because only one cohort is assessed, it is not possible to determine whether the observed changes are age-related changes or changes that are unique to the cohorts examined.

Sequential Research Designs

Both cross-sectional and longitudinal studies provide useful information but, as we have seen, each has limitations. A **sequential research design** combines the best features of cross-sectional and longitudinal research by assessing multiple cohorts over time, enabling scientists to make comparisons that disentangle the effects of cohort and age (see Table 1.7). Consider the alcohol use study once more. A sequential design would begin in 2020 by administering a survey to students in 6th, 8th, 10th, and 12th grades. Two years later, in 2022, the initial sample is surveyed again; the 6th graders are now 8th graders, 8th graders have become 10th graders, 10th graders have become 12th graders, and the 12th graders have graduated from the school and so are not assessed. Instead, a new group of 6th graders is surveyed. Two years later, in 2024, the participants are surveyed again, and so on.

The sequential design provides information about age, cohort, and age-related change. The cross-sectional data (comparisons of 6th, 8th, 10th, and 12th graders from a given year) permit comparisons among age groups. The longitudinal data (annual follow-up of 6th graders through 12th grade) permit study of age-related change. The sequential component helps scientists separate cohort effects from age-related change. Because several cohorts are studied at once, the effect of the cohort can be studied. The sequential design is complex, but it permits human development researchers to disentangle the effects of age and cohort and answer questions about developmental change.

In summary, scientists use the scientific method to systematically ask and seek answers to questions about human development. Researchers’ decisions about measures, such as whether to use self-report or observational measures, influence the information that they collect and the conclusions that they make. Choice of research method also influences conclusions researchers make about development, including statements about age differences, age change, and information about cohort effects. Researchers have responsibilities to conduct sound research and also to adhere to standards of ethical conduct in research, as the next section describes. See Table 1.8 for a comparison of research designs.

**TABLE 1.7 • Sequential Research Design**

<table>
<thead>
<tr>
<th>Year</th>
<th>2020</th>
<th>2022</th>
<th>2024</th>
<th>2026</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>6th grade</td>
<td>A</td>
<td>E</td>
<td>F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th grade</td>
<td>B</td>
<td>A</td>
<td>E</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>10th grade</td>
<td>C</td>
<td>B</td>
<td>A</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>12th grade</td>
<td>D</td>
<td>C</td>
<td>B</td>
<td>A</td>
<td>E</td>
</tr>
</tbody>
</table>

A sequential design combines cross-sectional and longitudinal designs, permitting the researcher to study multiple cohorts over time.

Source: Table 1 from Kim & Böckenholt, Psychological Methods, 5(3), Sep 2000, 380–400.
TABLE 1.8 • Comparing Research Designs

<table>
<thead>
<tr>
<th>DESIGN</th>
<th>STRENGTHS</th>
<th>LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Designs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case study</td>
<td>Provides a rich description of an individual.</td>
<td>Conclusions may not be generalized to other individuals.</td>
</tr>
<tr>
<td>Correlational</td>
<td>Permits the analysis of relationships among variables as they exist in the real world.</td>
<td>Cannot determine cause and effect relations.</td>
</tr>
<tr>
<td>Experimental</td>
<td>Permits a determination of cause-and-effect relations.</td>
<td>Data collected artificial environments may not represent behavior in real-world environments.</td>
</tr>
<tr>
<td>Developmental Research Designs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitudinal</td>
<td>Permits the determination of age-related changes in a sample of participants assessed for a period of time.</td>
<td>Requires a great deal of time, resources, and expense. Participant attrition may limit conclusions. Cohort-related changes may limit the generalizability of conclusions.</td>
</tr>
<tr>
<td>Cross-sectional</td>
<td>More efficient and less costly than the longitudinal design. Permits the determination of age differences.</td>
<td>Does not permit inferences regarding age change. Confounds age and cohort.</td>
</tr>
<tr>
<td>Sequential</td>
<td>More efficient and less costly than the longitudinal model. Allows for both longitudinal and cross-sectional comparisons which reveal age differences and age change, as well as cohort effects.</td>
<td>Time consuming, expensive, and complicated in data collection and analysis.</td>
</tr>
</tbody>
</table>

Thinking in Context 1.4

Dorothy is interested in understanding smoking in middle school students. Specifically, she believes that low self-esteem causes students to smoke.

1. How might Dorothy gather information to address her hypothesis?
2. What kind of research design should Dorothy use? What are the advantages and disadvantages of this design?
3. What are some of the challenges of measuring behaviors such as smoking and internal characteristics such as self-esteem?
4. How can her study be improved to overcome the weaknesses you have identified?

Ethical Issues in Research

LO 1.5 Discuss the responsibility of researchers to their participants and how they may protect them.

Suppose a researcher wanted to determine the effects of an illegal drug on pregnant women, or the effects of malnutrition on kindergarteners. Would it be possible to design a study in which certain pregnant women were assigned to ingest the illegal drug? Or one in which certain kindergarteners were deprived of food? If you answered “no,” you are correct, for United States and international laws regulate what kinds of research can be conducted and whether such research can expose participants to any harm, or risk of harm. These kinds of questions, laws, and regulations are in the realm of ethics—the determination of right and wrong.
Developmental scientists’ work is guided by five ethical principles: (1) beneficence and nonmaleficence; (2) responsibility; (3) integrity; (4) justice; and (5) respect for autonomy (American Psychological Association, 2010). Beneficence and nonmaleficence are the dual responsibilities to do good and not to do harm. Researchers must protect and help the individuals, families, and communities with which they work by maximizing the benefits and minimizing the potential harms of their work. For example, when interviewing survivors of a natural disaster, such as an earthquake or tornado, a scientist pays attention to their participants’ demeanor. If a participant shows distress in response to a particular set of questions, the scientist might direct, or even accompany, the participant to a therapist or mental health professional who can help him or her manage the distress.

Scientists act responsibly by adhering to professional standards of conduct, clarifying their obligations and roles to others, and avoiding conflicts of interest. For example, a psychologist who conducts research with children and parents must clarify her role as scientist and not therapist and help her participants understand that she is simply gathering information from them rather than conducting therapy. In this way, scientists recognize that they are responsible to people, communities, and society.

The principle of integrity requires that scientists be accurate, honest, and truthful in their work and make every effort to keep their promises to the people and communities with which they work.

Scientists have a special obligation to respect participants’ autonomy, the ability to make and implement decisions. Scientists show respect for the individuals and families they work with by giving them information about the research study, answering questions, helping them to make their own decisions about whether to participate in the study, and accepting their decisions. Respecting people’s autonomy also means protecting those who are not capable of making judgments and asserting themselves. For example, some adults, such as those who have suffered traumatic brain injuries, may have cognitive and social deficits that make them unable to make and carry out decisions about whether to participate in research. Scientists who work with patients who may be unable to make such judgments must carefully assess each patient’s capacity and devise ways of protecting those who are not competent, such as by approaching the individual who is responsible for making legal decisions on the part of the patient.

Finally, the principle of justice means that the benefits and risks of participation in research must be spread equitably across individuals and groups. Scientists must take care to ensure that all people have access to the contributions and benefits of research.

These ethical principles form the basis of professional codes of ethics of the Society for Research in Child Development (2007) and American Psychological Association (2010), which provide guidelines for researchers who work with human participants.

**RESPONSIBILITIES TO PARTICIPANTS**

Researchers’ desire to answer questions, learn, and solve problems by conducting research may sometimes conflict with the need to protect participants. For example, suppose a physician is testing the effectiveness of a drug designed to lower blood pressure.
Over the course of the study, the scientist discovers that a participant has a heart defect that might someday require treatment. If the scientist discloses this information to the participant and encourages him or her to seek treatment, the scientist will have to remove the participant from the study. How should the scientist balance the research needs with the needs of participants? Scientists work to balance the benefits of research against the possible harm that can occur to participants, which includes mental, emotional, and physical risks.

In the United States and most other developed countries, carrying out research is a regulated activity. Each college, university, hospital, and organization that conducts research has an institutional review board (IRB) that examines all plans for conducting a study before it can begin. The IRB examines the proposed study in light of professional ethical codes as well as those articulated by the U. S. Department of Health and Human Services (2009). Do the study’s benefits for advancing knowledge and improving conditions of life outweigh the potential costs in terms of time, money, and possible harm on the part of participants? IRBs act to protect participants by ensuring that the study has scientific merit and that risks of participating in research do not outweigh its potential benefits.

Ethical codes of conduct require that researchers obtain informed consent from each participant—their informed, rational, and voluntary agreement to participate. Consent must be informed, meaning it is made with knowledge of the scope of the research, the potential for harm (if any), and the possible benefits of participating. Consent must be rational, meaning it must be made by a person capable of making a reasoned decision. Parents provide parental permission for their minor children to participate because researchers (and lawmakers) assume that minors are not able to meet the rational criteria of informed consent. Finally, participation must be voluntary, meaning that the decision to participate must be made freely and without coercion—individuals must understand that they are free to decide not to participate in the research study and that they will not be penalized in any way if they refuse.

Although children cannot provide informed consent, researchers respect their growing capacities for decision making in ways that are appropriate to their age by seeking assent, children’s agreement to participate. For a young child, obtaining assent may involve simply asking if he or she wants to play with the researcher and answer some questions. With increasing cognitive and social development, children are better able to understand the nature of science and engage meaningfully in decisions about research participation (Thompson, 1990). Researchers should tailor discussions about the nature of research participation to children’s capacities, provide more detailed information, and seek more comprehensive assent as children grow older (Kuther, 2003; Roth-Cline & Nelson, 2013). For example, a researcher about to administer early adolescents a questionnaire about their experiences with parental divorce might explain the kinds of questions the adolescents will encounter; explain that in some cases a question might feel personal and might bring up memories; remind the adolescents that they are free to stop or skip any questions they choose; and, finally, remind the adolescents that if they feel uncomfortable or would like to talk to someone about their feelings about the issues examined in the study, a counselor is available or the researcher can help them find someone who can help them. Moreover, seeking assent helps children learn how to make decisions and participate in decision-making as they are able. Assent provides minors with opportunities to gain decision-making experience within safe contexts.

The researcher’s ethical responsibilities do not end with obtaining informed consent. Most research studies are routine and uneventful because they are carried out according to plan. Sometimes, however, ethical issues arise during the course of a study. For example, suppose a researcher learns that a participant is in jeopardy, whether engaging in health-compromising behaviors (e.g., cigarette smoking, unsafe driving, or unhealthy behavior), contemplating suicide, or engaging in illegal or harmful activities
(e.g., drug addiction, stealing, or violence). Is a researcher responsible for helping the participant? Although current ethical guidelines address questions of researchers’ responsibilities to help participants in such situations, they leave a certain amount of judgment to the researcher.

The Society for Research in Child Development (SRCD) code of ethics (2007) suggests that researchers must help children in jeopardy by discussing the information with parents and guardians or with experts who may offer insight. Moreover, researchers may be faced with a conflict if they believe that helping the participant and dropping him or her from the research study may compromise the scientific integrity of the research, which may be especially likely if many participants are dropped. One study investigated this very issue by asking adolescents for their opinions on what researchers should do if they discover that a minor participant has a problem (Fisher, Higgins-D’Alessandro, Rau, Kuther, 1996). Older adolescents (e.g., age 17) tended to prefer that researchers not tell others about the problems and provide minors with self-referral information, whereas young adolescents (e.g., age 13) tended to prefer that researchers report problems and potential threats to parents or trusted adults (Fisher et al., 1996). In addition, the adolescents’ judgments depended on how serious they believed each problem to be. Adolescents favored reporting serious problems like abuse and threats of suicide to a parent or adult who can help. However, they preferred that the researcher not tell anyone about the problem and provide the child with self-referral information in cases of problems they rated as less serious, like smoking and nonviolent delinquent acts. Many questions remain unresolved. For example, does the age of the child matter in determining when to provide help? These are difficult decisions. Fortunately, serious ethical issues do not arise in most studies, but scientists should remain vigilant so that problems can be addressed should they arise. Table 1.9 summarizes the rights of research participants.

**TABLE 1.9 • Rights of Research Participants**

<table>
<thead>
<tr>
<th>RIGHT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection from harm</td>
<td>Regardless of age, research participants have the right to be protected from physical and psychological harm. Investigators must use the least stressful research procedure in testing hypotheses and when in doubt, consult with others. When harm is possible, researchers must determine another way to study the problem or abandon the research.</td>
</tr>
<tr>
<td>Informed consent</td>
<td>Participants have the right to be informed about the purpose of the research, expected duration, procedures, risks and benefits of participation, and any other aspects of the research that may influence their willingness to participate. When children are participants, a parent or guardian must provide informed consent on behalf of the child. The child should be provided information about research participation in terms appropriate to his or her development and the investigator should seek assent from the child as a way of respecting the child’s autonomy.</td>
</tr>
<tr>
<td>Voluntariness</td>
<td>Participants, regardless of age, have the right to choose not to participate or to discontinue participation in research at any time and without penalty.</td>
</tr>
<tr>
<td>Confidentiality</td>
<td>Participants have the right to conceal their identity on all information and reports obtained in the course of research.</td>
</tr>
<tr>
<td>Reporting results</td>
<td>Participants have the right to be informed of the results of research in language that is appropriate to their level of understanding.</td>
</tr>
<tr>
<td>Right to treatment</td>
<td>If an experimental treatment under investigation is believed to be beneficial, participants in control groups have the right to obtain the beneficial treatment.</td>
</tr>
</tbody>
</table>

Source: APA (2010); SRCD (2007).
Responsibilities to Society

Researchers are responsible not only to their participants but also to society at large. In reporting results, researchers should be mindful of the social and political implications of their work (SRCD, 2007). Researchers must consider how their findings will be portrayed in the media and attempt to foresee ways in which their results may be misinterpreted. This is a difficult task, but it is very important for researchers to be prepared to address questions raised as well as correct misinterpretations of research (National Academy of Sciences, 1995).

For example, one highly publicized study compiled the existing research literature examining college students who had become sexually involved with an adult prior to reaching the legal age of consent (Rind, Tromovitch, & Bauserman, 1998). After using statistics to summarize the findings of many research studies, the scientists determined that the college students’ coping and development varied depending on a number of other factors within the individual, situation, and broader context. Not all appeared to be harmed and many did well. However, some organizations, media outlets, and politicians misinterpreted the researchers’ findings as suggesting that sexual involvement with minors was acceptable or even beneficial (Garrison & Kobor, 2002). Instead, the findings suggested that there are a range of outcomes to adult–minor relationships, and that the outcomes varied with the age of the minor and other characteristics of the situation. For example, the participants who seemed to be unharmed were more likely to be older (e.g., age 17) when the relationship began. Researchers must consider the potential social and political implications of their work, attempt to foresee the inferences that people may draw about their findings, and prepare to correct misinterpretations.

Lifespan human development is a broad field of study that integrates theory and research from many disciplines in order to describe, predict, and explain how we grow and change throughout our lifetime. Developmental scientists apply their knowledge to identify, prevent, and solve problems, and improve opportunities for individuals, families, and communities. Throughout this book you will learn the fundamentals of lifespan human development, including physical, cognitive, and socioemotional change, as well as the implications development science holds for social issues. We begin our journey by considering the role of genetics and environment in shaping who we become, as described in Chapter 2.

Thinking in Context 1.5

1. Suppose, as part of your research, you wanted to interview children at school. What ethical principles should you keep in mind? Why? What challenges do you anticipate?

2. Consider collecting observations and interviews of older adults in a nursing home. What ethical issues can you anticipate? What principles are most pertinent?

Apply Your Knowledge

1. Steven enters the school psychologist’s office with a frown, grumbling to himself. His teacher, Ms. Marta, has suggested that he visit the school psychologist for help understanding and treating his academic problems. Steven is a bright fifth grader, but he has great difficulties reading and his mathematics skills lag far behind his peers. Ms. Marta contacts Steven’s mother, reassuring her that the school has excellent resources for diagnosing children’s learning problems and special education professionals who can intervene and help children overcome learning difficulties.

   The school psychologist interviews Steven’s mother in order to compile a history of Steven’s development. Through this interview he learns that Steven suffered a great deal of trauma early in
life; as an infant he was physically abused by his biological mother, then taken away and placed in foster care. At age 3 he was adopted into a middle-class, suburban family with two older, non-adopted, children.

As we have seen, each developmental theory has a unique emphasis. How might each theory address Steven’s academic difficulties?

(a) What factors would psychoanalytic theories point to in order to explain Steven’s functioning?
(b) How would cognitively oriented theories, such as Piaget’s cognitive-developmental theory and information processing theory, account for and intervene with Steven’s difficulties?
(c) Identify contextual factors that may play a role in Steven’s academic problems; from Bronfenbrenner’s bioecological theory, what factors may be addressed?

2. Suppose you wanted to conduct research on academic achievement during elementary and middle school.

(a) Identify a research question appropriate for a correlational research study.
(b) How would you address that question with a cross-sectional research study? Longitudinal? Sequential?
(c) What are the advantages and disadvantages of each type of study?
CHAPTER 1 IN REVIEW

1.1 Outline five principles of the lifespan developmental perspective.

SUMMARY
Development is a lifelong process. It is multidimensional, multidirectional, plastic, influenced by the multiple contexts in which we are embedded, and multidisciplinary.

KEY TERMS
- lifespan human development
- physical development
- cognitive development
- socioemotional development
- plasticity
- resilience
- context
- culture
- cohort

REVIEW QUESTION
What are five principles developmental scientists use to explain lifespan development?

1.2 Discuss three theoretical controversies about human development.

SUMMARY
Theories of human development can be compared with respect to their stance on the following questions. First, in what ways is developmental change continuous, characterized by slow and gradual change; or discontinuous, characterized by sudden and abrupt change? Second, to what extent do people play an active role in their own development, interacting with and influencing the world around them? Finally, is development caused by nature or nurture—genetic endowments and heredity or the physical and social environment? Most developmental scientists agree that some aspects of development appear continuous and others discontinuous, individuals are active in influencing their development, and development reflects the interactions of nature and nurture.

KEY TERMS
- continuous (development)
- discontinuous (development)
- nature-nurture issue

REVIEW QUESTION
What position do most contemporary developmental scientists take on each of the three theoretical controversies about human development?

1.3 Summarize five theoretical perspectives on human development.

SUMMARY
Freud’s psychosexual theory explains personality development as progressing through a series of psychosexual stages during childhood. Erikson’s psychosocial theory suggests that individuals move through eight stages of psychosocial development across the lifespan, with each stage presenting a unique psychosocial task, or crisis. Behaviorist theory emphasizes environmental influences on behavior, specifically classical conditioning and operant conditioning. In classical conditioning neutral stimuli become associated with stimuli that elicit reflex responses. Operant conditioning emphasizes the role of environmental stimuli in shaping behavior through reinforcement and punishment. Bandura’s social learning theory includes cognition, and Bandura suggested that individuals and the environment interact and influence each other through reciprocal determinism. Piaget’s cognitive-developmental theory explains that children actively interact with the world around them and their cognition develops through four stages. Information processing theorists study the steps entailed in cognition: perceiving and attending, representing, encoding, retrieving, and problem solving. Sociocultural systems theories look to the importance of context in shaping development. Vygotsky’s sociocultural theory emphasizes interactions with members of our culture in influencing development. Bronfenbrenner’s bioecological model explains development as a function of the ongoing reciprocal interaction among biological and psychological changes in the person and his or her changing context: the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. Ethology and evolutionary developmental psychology integrate Darwinian principles of evolution and scientific knowledge about the interactive influence of genetic and environmental mechanisms.

KEY TERMS
- continuous (development)
- discontinuous (development)
- nature-nurture issue

REVIEW QUESTION
How do five major theoretical perspectives account for human development?
1.4 Describe the methods used in studying human development, including types of data and designs.

SUMMARY
A case study is an in-depth examination of an individual. Interviews and questionnaires are called self-report measures because they ask the persons under study questions about their own experiences, attitudes, opinions, beliefs, and behavior. Observational measures are methods that scientists use to collect and organize information based on watching and monitoring people’s behavior. Physiological measures gather the body’s physiological responses as data. Scientists use correlational research to describe relations among measured characteristics, behaviors, and events. To test hypotheses about causal relationships among variables, scientists employ experimental research. Developmental designs include cross-sectional research, which compares groups of people at different ages simultaneously, and longitudinal research, which studies one group of participants at many points in time. Sequential designs combine the best features of cross-sectional and longitudinal designs, by assessing multiple cohorts over time.

KEY TERMS
applying developmental science
scientific method
open-ended interview
structured interview
questionnaire
naturalistic observation
structured observation
correlational research
experimental research
dependent variable
independent variable
random assignment
cross-sectional research
longitudinal research
sequential research
design

1.5 Discuss the responsibility of researchers to their participants and how they may protect them.

SUMMARY
Researchers must maximize the benefits to research participants and minimize the harms, safeguarding participants’ welfare. They must be accurate and honest in their work and respect participants’ autonomy, including seeking informed consent and child assent. In addition, the benefits and risks of participation in research must be spread equitably across individuals and groups.

KEY TERM
informed consent

REVIEW QUESTIONS
1. What are methods for collecting data and answering research questions?
2. What designs do researchers use to study development?

REVIEW QUESTION
What ethical responsibilities do researchers have to their participants?

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- Practice quizzes to test your comprehension of key concepts
- Videos and multimedia content to enhance your exploration of key topics

edge.sagepub.com/kuthertopical
Physical development is perhaps the most easily recognizable developmental change that we experience over our lives. It comprises growth and maturation, and changes in sensory, neurological, and motor abilities.

Physical development begins at conception with the formation of a zygote. Our traits are influenced by complex interactions of genes and contextual factors, such as environmental circumstances, stressors, and opportunities, that determine whether genetic potentials are realized.

Most of us are born with all of our senses—able to see, hear, smell, taste, and touch. Likewise, we are born with billions of brain cells called neurons. As we develop, the number of connections among neurons increases, and neural communication becomes quicker, contributing to more efficient cognition. Brain development continues throughout life. Some neural plasticity, the capacity to change in response to experience, is retained in adulthood.

Like other aspects of physical development, motor development unfolds in a predictable sequence in infancy and childhood and continues to change over the lifespan. In adulthood the rate and extent of change varies. Adults who remain physically active can compensate for age-related declines and may retain their strength, balance, and endurance as well as experience better overall health and well-being, with positive implications for cognitive and socioemotional functioning in the many contexts in which they live.