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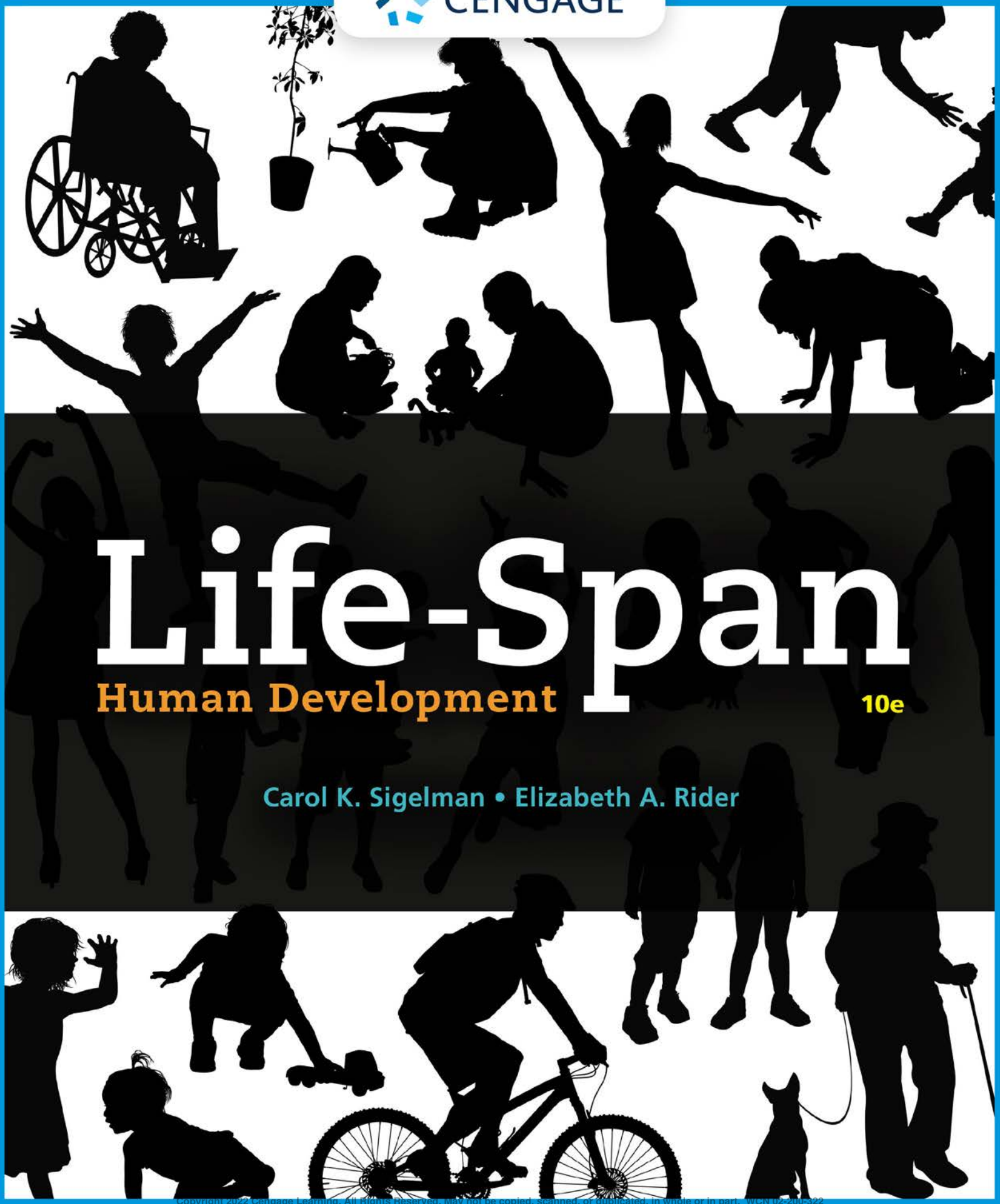
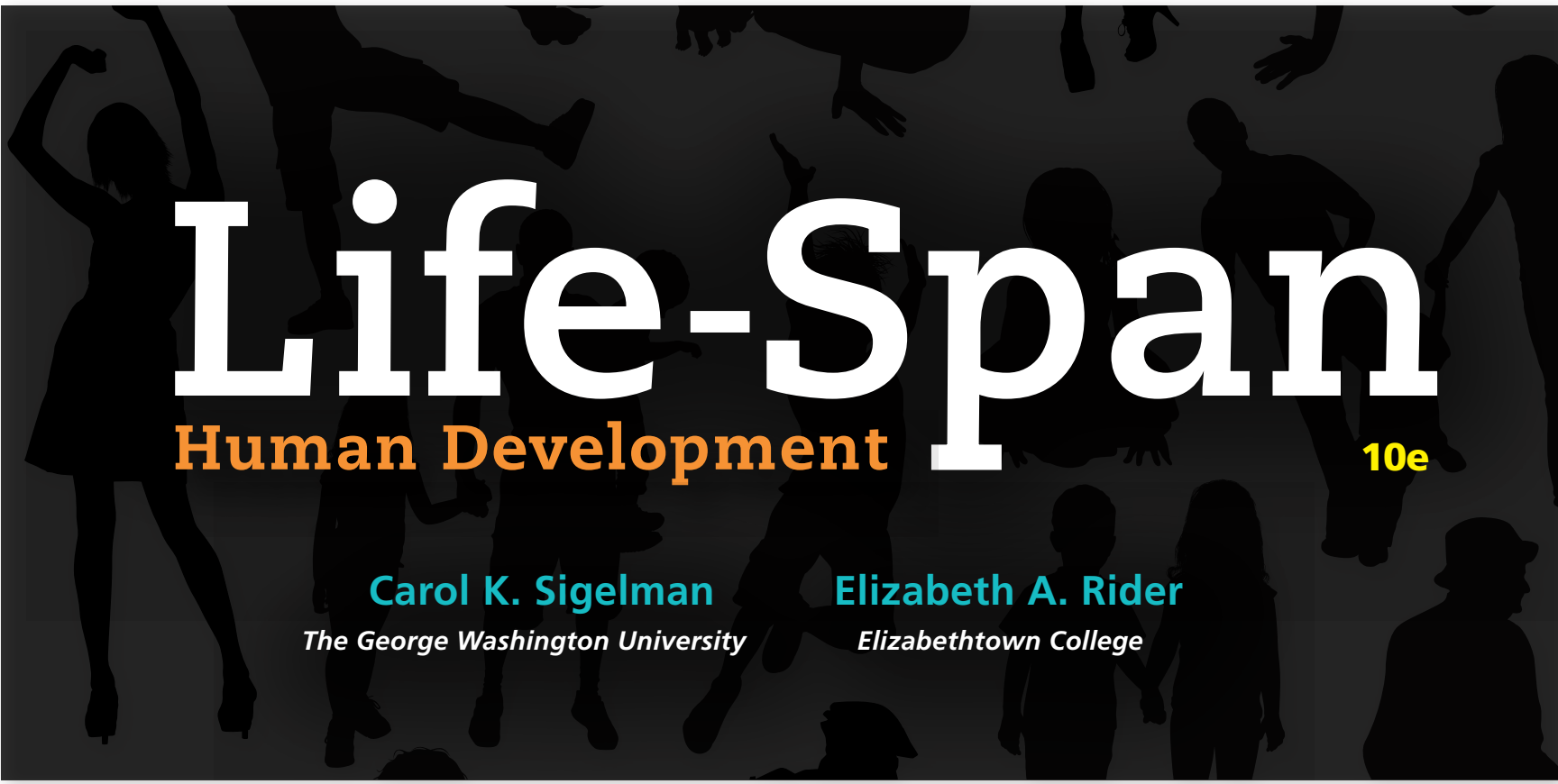


Life-Span

Human Development

10e

Carol K. Sigelman • Elizabeth A. Rider



Life-Span

Human Development

10e

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***Life-Span Human Development,* Tenth Edition**
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Cover Design: Bethany Bourgeois

Interior Design: Vernon Boes/Bethany Bourgeois

Cover Image Sources: iStockPhoto.com/AskinTulayOveriStockPhoto.com/4x6iStockPhoto.com/ChrisGorgioiStockPhoto.com/majiveckaiStockPhoto.com/VectorigiStockPhoto.com/d-l-b

Library of Congress Control Number: 2021903829

ISBN: 978-0-357-37365-1

Loose-leaf:
ISBN: 978-0-357-37372-9

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200 Pier 4 Boulevard
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Printed in the United States of America
Print Number: 01 Print Year: 2021

To the students who have inspired us

Brief Contents

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Preface

This book, *Life-Span Human Development*, is about the development of human beings—from their start as fertilized eggs to their dying days. It explores regularities as well as differences in development, and it asks fundamental questions about why we humans develop as we do. We are delighted to have given birth to the book's 10th edition, which retains four core features valued by students and instructors over the years: (1) our unique integrated topical-chronological approach, (2) a presentation that is both research based and relevant to students, (3) an emphasis on ideas—on the theoretical perspectives that guide thinking about human development and research, and (4) an in-depth exploration of the all-important nature–nurture issue and the ongoing interplay of biological, psychological, and social influences in development. In addition, we introduce exciting new topics and controversies in life-span human development, update coverage throughout, and offer a range of pedagogical features and supplements to enhance the teaching–learning process.

Topical and Chronological Approach

The most distinctive feature of this book is its unique integrated topical-chronological approach. Almost all other life-span development textbooks adopt a chronological or "age-stage" approach, carving the life span into age ranges and describing the prominent characteristics of individuals within each age range. In contrast, we adopt a topical approach for the overall organization of the book blended with a chronological approach within chapters. Each chapter focuses on a domain of development, such as cognition, personality, or social relationships, and traces developmental trends and influences in that domain from infancy to old age. At the same time, each chapter highlights the special qualities of different age groups through major sections on infancy, childhood, adolescence, and adulthood.

Why Topical?

Like many other instructors, we have typically favored topically organized textbooks when teaching child, adolescent, or adult development. As a result, it seemed natural to extend that same topical approach to the whole life span. It also bothered us that chronologically organized texts often have to repeat themselves to remind readers of where development left off in an earlier age period that was covered much earlier in the book.

More important, a topic-by-topic organization conveys the flow of development in each area. The topical approach also helps us emphasize the processes behind development. Finally, a topical approach captures the spirit of a life-span perspective on development: It encourages us—indeed obliges us—to view each period of life in relation to what comes before and what comes after. In chronologically organized textbooks, many topics are taken up only in connection with the age group to which they seem most relevant and are then dropped. A topical organization stimulates us to ask intriguing questions we might otherwise not ask, such as these about close relationships:

- What do infants' attachments to their parents have in common with, and how do they differ from, attachments between childhood friends or between adult romantic partners?
- Do securely attached infants later have a greater capacity to form and sustain close relationships than infants whose early social experiences are less favorable?
- What are the consequences at different points in the life span of lacking a close relationship?

Attachments are important throughout the life span and evolve over the life span; a topical organization helps make that clear.

Why Chronological?

We also appreciate the strengths of the chronological approach, particularly its ability to portray the whole person in each period of the life span. For this reason, we integrated the age-stage approach with the topical organization, aiming to have the best of both worlds.

Each topical chapter contains major sections on infancy, childhood, adolescence, and adulthood. These age-stage sections call attention to the distinctive qualities of each phase of life and make it easier for students to find material on an age period of particular interest to them. In short, we believe that our integrated topical-chronological approach gives students exactly what they deserve: an understanding of the flow of life-span development in particular areas and the factors influencing it along with an appreciation of the flavor of each developmental period.

Adaptability of the Integrated Topical-Chronological Approach

Even though links across chapters are noted throughout the book, instructors who are teaching condensed courses or who are otherwise pressed for time can omit a chapter without fear of rendering other chapters incomprehensible. For example:

- A cognitively oriented course might omit one or more of the psychosocially oriented chapters (Chapters 10, 11, 12, 13, 14, 15, and 16).
- A psychosocially oriented course might omit one or more of the cognitively oriented chapters (Chapters 5, 6, 7, 8, and 9).

Moreover, this approach gives instructors the flexibility to cover infancy, childhood, and adolescence in the first portion of the course, if they prefer, and to save the material on adulthood for the end.

Research-Oriented and Relevant Coverage

We have worked hard to create a text that is rigorous yet readable—research oriented yet "real" to students. The 10th edition of *Life-Span Human Development* tackles complex theoretical controversies and presents both classic and contemporary research from multiple disciplines. We aim to make developmental science accessible and relevant to students' lives and career goals but we do not "dumb it down."

Students need to understand how we know what we know about development—to appreciate the research process. With that in mind, we describe illustrative studies, present data in graphs and tables, and cite the authors and dates of publication for a large number of books and articles, all fully referenced in the bibliography at the end of the book. Some students may wonder why they are there. It is because we are committed to the value of research, because we are bound to give credit where credit is due, and because we want students and their professors to have the resources they need to pursue their interest in a topic during and after the course.

We also appreciate that solid scholarship is of little good to students unless they want to read it, can understand it, and see its relevance. To make the material more "real," we clarify developmental concepts through examples, analogies, and visuals; we connect topics in the text to topics in the news, and highlight the practical implications of research findings. This book contains a wealth of applied material relevant to students' current and future roles as parents, teachers, psychologists, health professionals, and other human service professionals. It helps students see that major theories of human development do not just guide researchers but can guide them—for example, in raising, educating, or treating infants, children, or adolescents; understanding themselves and making important life decisions; appreciating that their parents and grandparents are also developing persons; and coping with developmental challenges.

Theoretical Grounding

Theories are critical in any science, guiding scientists on what to study, how to study it, and how to interpret their findings. We want students to leave the study of life-span human development with more than facts alone; we want them to appreciate how the leading theories in the field have shaped our thinking about development. Most important, we want students to learn to use these theoretical perspectives to guide their thinking and action when they encounter a question about human development outside the course. Previous users of the book will notice that Chapter 2, Theories of Human Development, no longer exists but will quickly see that our emphasis on theory remains as strong as ever:

- We offer a quick overview of five major theoretical perspectives in Chapter 1: the evolutionary, psychoanalytic, cognitive-developmental, learning, and bioecological perspectives, giving Urie Bronfenbrenner's bioecological theory a close look there because it captures today's systems theory view of development.
- We highlight evolutionary theory in Chapter 2 and show its application in Chapter 12 to moral development and in Chapter 13 to attachment theory.
- We look at Jean Piaget's groundbreaking cognitive-developmental theory in Chapter 6, contrasting it with other views of cognitive development (especially Lev Vygotsky's sociocultural perspective in Chapter 6 and the information-processing perspective in Chapter 7).
- In Chapter 7, learning theories, including Albert Bandura's cognitive social learning theory, take the stage and help us understand socialization and learning throughout the book.
- Psychoanalytic theory appears in Chapter 10, with emphasis on Erik Erikson's life-span psychosocial theory in comparison to other views of personality development.
- In addition, we highlight these and additional theoretical viewpoints as appropriate to particular topics: for example, nativist and learning theories of language development in Chapter 9, theories of gender development in Chapter 11, attachment theory in Chapter 13, and family systems theory in Chapter 14.
- Finally, we bring the five broad theories introduced in Chapter 1—the evolutionary, psychoanalytic, cognitive-developmental, learning, and bioecological perspectives—to bear on the same issue in a new Appendix A, Applying and Comparing Theories, that asks how these theories can help us understand sexual risk behavior in adolescence.

Nature–Nurture Theme

Finally, we want students to gain a deeper understanding of the nature–nurture issue and of the many interacting forces affecting the developing person. We want students to appreciate that human development is an incredibly complex process that grows out of transactions between a changing person and a changing world and out of dynamic relationships among biological, psychological, and social influences. No contributor to development—a gene, a temperament, a parent, a culture—acts alone and is unaffected by other influences on development.

We introduce the nature–nurture issue in Chapter 1 and give it extended treatment in Chapter 2 on genes and environment. Each subsequent chapter includes one or more illustrations of the intertwined contributions of nature and nurture to development and aging, and Chapter 15 looks at their roles in the development of psychological disorders. Along the way, we describe exciting studies that bring home what it means to say that there is an interplay of genes and environment in development—for example, ways in which genetic makeup influences the experiences an individual has and ways in which experience can affect the activation or expression of genes in ways that alter development.

In this edition, we have worked extra hard to show how much today's developmental scientists are learning about the intricacies of nature and nurture. We have incorporated new discoveries about genes, hormones, neural networks, and other biological forces in development. We have also strengthened coverage of contextual influences on development—ways in which developmental pathways can differ, sometimes dramatically, depending on the individual's family, school, neighborhood, social class, and subcultural and cultural contexts. Most important, we illuminate the interplay between biological and environmental influences that is at the heart of the developmental process—and that makes it difficult to leave this course as either an extreme nativist or an extreme environmentalist.

Organization of the Text

Core Concepts: Chapters 1 to 3

The book begins by orienting students to the life-span perspective on human development, major theoretical perspectives on development, and approaches to the scientific study of development (Chapter 1). Next, it explores developmental processes in some depth, examining genetic and environmental influences on development (Chapter 2) and then focusing on important environmental influences during the critical prenatal and perinatal periods (Chapter 3).

Development of Basic Human Capacities: Chapters 4 to 9

Chapters on the growth and aging of the body and nervous system and on health (Chapter 4) and on the development of sensory, perceptual, and motor capacities (Chapter 5) launch our examination of the development of basic human capacities. Chapter 6 turns to cognitive development, starting with the influential theory of Piaget and then moving on to Vygotsky's and Fischer's perspectives; Chapter 7 views learning and memory from an information-processing perspective; Chapter 8 highlights the psychometric approach to cognition, exploring individual differences in intelligence and creativity; and Chapter 9 explores the roles of motivation and cognition in language development, education, and work.

Development of Self in Society: Chapters 10 to 16

The next three chapters concern the development of the self: changes in self-conceptions and personality (Chapter 10); in gender roles and sexuality (Chapter 11); and in social cognition, morality, and prosocial and antisocial behavior (Chapter 12). The self is set more squarely in a social context as we trace life-span changes in emotions and attachment relationships (Chapter 13) and in roles and relationships within the family (Chapter 14). Finally, we offer a life-span perspective on developmental problems and disorders (Chapter 15) and examine how humans of different ages cope with dying and bereavement (Chapter 16).

Getting the Big Picture

To help students pull together the "big picture" of life-span human development at the end of the course, we remind students of some of the major themes of the book at the end of Chapter 16 and offer a chart inside the back cover that summarizes major developments in each of seven periods of the life span. Finally, Appendix A, Applying and Comparing Theories, helps students review and apply the five theoretical perspectives first introduced in Chapter 1, and Appendix B, Careers in Human Development, lays out possibilities for translating an interest in human development into a career in research, teaching, or professional practice.

Engaging Students

The 10th edition provides learning objectives for each major numbered section and continues to use a variety of other strategies to increase students' engagement with the material and, more importantly, their learning.

Learning Objectives

Each major numbered section starts with two to five learning objectives to focus students' reading and give it purpose.

Checking Mastery Questions

To encourage students to actively check their command of the material as they progress through the chapter, we pose two to four Checking Mastery questions at the end of each numbered chapter section. Instructors can find the answers in the *Instructor's Manual* and can decide whether they want to use the questions as assignments or test items or give the answers to students so that they can test their own mastery.

Making Connections Questions

Also at the end of each major section, Making Connections questions invite students to reflect on the material—to weigh in on a debate in the field, evaluate the material's implications for public policy, apply the material to a case example, or explore the material's relevance to their own development. These questions can serve as the basis for writing assignments, essay questions, or class discussions.

Boxes

The topics we address in boxes sprinkled throughout the chapters were chosen because they struck us as both interesting and important; they are not fluff to be skipped! This edition typically includes one of each of the following three types of boxes in each chapter:

- **Exploration boxes** allow more in-depth investigation of research or thinking on a topic.
- **Application boxes** examine how knowledge has been applied to optimize development.

- **Engagement boxes** provide opportunities for students to engage personally and actively with the material—to assess their own knowledge, beliefs, traits, and attitudes by completing personality scales, test items, surveys, and short quizzes.

To see the titles of these boxes, scan the table of contents.

New to This Edition

As noted already, Chapter 2 on theories has been dropped from this edition in favor of coverage of major theories in the chapters to which they most pertain. As a result, previous users of our book will need to learn, as we have learned, a new math: Simply subtract 1 from a chapter number in the ninth edition to derive its chapter number in the 10th edition. We have also shifted a few topics from one chapter to another, as explained below. Finally, and as always, the book has been thoroughly updated and revised to convey the most recent discoveries and insights developmental scientists have to offer and it includes some exciting new topics. A few examples follow.

Chapter 1. Understanding Life-Span Human Development

- Introduces five major theoretical perspectives: the evolutionary, psychoanalytic, cognitive-developmental, learning, and bioecological perspectives.
- Focuses on three major issues in development: nature–nurture, continuity–discontinuity, and universality–context specificity
- Continued use of research on our digital social environment to illustrate research methods—for example, a study on adult use of the Internet to illustrate how cross-sectional and longitudinal studies can give quite different pictures of development and a new Exploration box on the implications of heavy social media use for adolescent mental health

Chapter 2. Genes, Environment, and Development

- Expansion of coverage of evolutionary theory as a major perspective on human development, including research on fast versus slow life history strategies
- Reduction and reorganization of material on behavioral genetics research findings
- More on epigenetic effects of the environment on gene expression, including intergenerational transmission of a learned fear from (mouse) father to his offspring

Chapter 3. Prenatal Development and Birth

- New section on opioid use during pregnancy and its effects on development, along with other contemporary updates
- New material on cultural practices related to the umbilical cord after birth
- New section on lesbian couples experiencing pregnancy and delivery
- Box on breastfeeding versus formula (bottle) feeding

Chapter 4. Body, Brain, and Health

- Use of a biopsychosociocultural model to frame the discussion on health throughout the chapter
- Significant revision and updating of the chapter's figures
- Significant revisions of coverage of the adult brain, including a new section on neurocognitive maintenance, reserve, and compensation
- Better balance of coverage of male and female reproductive changes with added material on the prostate gland
- New material on how early hemispheric lateralization of the brain can influence later development

Chapter 5. Sensation, Perception, and Action

- Relocation of material on physical behavior from the chapter on health to this chapter as part of a strengthening of the "action" part of this chapter
- New material on the coupling of perception and action by athletes
- New figures to enhance visual appeal

Chapter 6. Cognition

- Reorganization to make Fischer's dynamic skill theory part of a section on modern approaches to cognitive development that also includes Bjorklund's evolutionary theory
- Transfer of the discussion of Piaget's contributions to our understanding of intelligence to the chapter on intelligence
- New Application box focused on early childhood education

Chapter 7. Memory and Learning

- A new chapter title, Memory and Learning, to reflect the transfer of learning theories into this chapter—and to make for a smooth flow from the learning theories section to the "The Infant" section, where basic learning techniques are applied to study infants' memories
- Updating of material on the neural bases of memory through inclusion of the Lonnie Sue case study of amnesia and its implications for how memories are stored and processed and new material on place cells and grid cells
- Updating of Siegler's theory to use the now more common label, "adaptive strategy choice model"
- Reorganization of "The Adult" section to start with material on memory and aging and flow to autobiographical memory, developing expertise, and learning and aging

Chapter 8. Intelligence and Creativity

- Incorporation of coverage of the extremes of intelligence in the early section on the psychometric approach to intelligence
- Inclusion of Gardner's theory and Sternberg's theory in a single section on theories of multiple intelligences
- Updating of Cattell-Horn theory as the Cattell-Horn-Carroll theory
- Inclusion of race and ethnicity in a section on culture

Chapter 9. Language, Education, and Work

- Change of the chapter's title to "Language, Education, and Work" to reflect movement of material on vocational development from the former Chapter 11 to this chapter to better portray achievement-related activities across the life span
- Movement of the Application Box, "What Can Theory and Research Contribute to Education?" to the section "The Child"

Chapter 10. Self and Personality

- A fuller account of Erikson's psychosocial theory and its relevance to the self and personality development from infancy to old age
- To highlight racial/ethnic identity formation, new material on Kamala Harris and Barack Obama and description of a program called the Identity Project designed to help teens of all backgrounds develop a positive racial/ethnic identity
- More on infant self-awareness and cultural influences on it
- The Big Five dimensions of personality in relation to hormones and the brain
- A new discussion on aging featuring Rowe and Kahn's definition of successful aging and Ryff's alternative conception of psychological well-being in later life

Chapter 11. Gender Roles and Sexuality

- A new section on anatomy and physiology at the beginning of the chapter highlights the latest research on biological and brain differences between males and females
- Inclusion of material on gender identity in the section on gender roles and stereotypes
- More inclusive discussion of alternate gender identity pathways in "The Adolescent" section and throughout the chapter
- The latest research on transgender and nonbinary identities
- Update on teenage sexual behavior to reflect recent declines in sexual activity

Chapter 12. Social Cognition and Moral Development

- New chapter opener contrasting prosocial and antisocial behavior to set up the chapter's inquiry into these two sides of human nature
- More on the evolved social brain
- Tomasello's evolutionary perspective on early social and moral behavior, including research on the capacity of young children to learn, uphold, and enforce social norms
- Revised coverage of self-control, including new cross-cultural research on responses to Mischel's famous marshmallow test
- New box on callous-unemotional traits in childhood and their relationship to conduct disorder and antisocial personality later in life
- New material on social and emotional learning programs
- Culture and the roles of autonomy, community, and divinity in moral thinking

Chapter 13. Emotions, Attachment, and Social Relationships

- New chapter opener on family separations at the U.S.–Mexico border and more on the implications of parent–child separations
- Feldman Barrett's constructivist view of emotions to contrast with the view that emotions are biologically "hard wired"
- More on hormonal and neural changes in new parents and their relationship to parent–infant synchrony and attachment
- More on culture and caregiving (including alloparenting) in relation to attachment
- Updates on adolescent dating and connections among parent, friend, and romantic partner attachments
- Reorganization and updating of adult attachment material

Chapter 14. The Family

- Updated list of changes in family life, incorporating many of the most recent research reviews published by the *Journal of Marriage and Family*
- New research on parenting and health risks, including associations between raising multiple children and both increased allostatic load and shortened telomeres
- New coverage of multiple forms of family violence, including parental alienation and elder abuse, and conclusions from a recent meta-analysis of contributors to child abuse
- Box on societal changes in China and their implications for both children and adults

Chapter 15. Developmental Psychopathology

- Expansion of the developmental psychopathology section to address nature–nurture, continuity–discontinuity, and universality–context-specificity issues at the start of the chapter before they are illustrated for specific conditions
- The latest research on Parent–Child Interaction Therapy for children with depression
- A new Application box on the development of anxiety disorders, including an intervention to reduce parents' accommodations to a child's anxieties
- Updates on the brains of individuals with attention-deficit/hyperactivity disorder
- Extended discussion of how changes in adolescence (hormonal, neural, and social) contribute to adolescent problem behaviors such as substance use and how adolescent problem behavior can pave the way to psychopathology
- New Exploration box on adverse childhood experiences and their association with adult physical and mental health problems

- Updated coverage of Alzheimer's disease highlighting the frustrations of the search for effective drug treatments and the promise of slowing cognitive decline by adopting healthier lifestyles

Chapter 16. The Final Challenge: Death and Dying

- A new chapter opener featuring the words of a man whose partner died of COVID-19
- Material on programmed and damage theories of aging (previously in Chapter 5), updated with new research on telomeres and an epigenetic aging clock influenced by both genes and environment
- New research on changing patterns of emotion in the years preceding a person's death
- Expanded coverage of differences in the socialization of children's beliefs about death in Mexican American and European American communities
- Expanded coverage of the debate about the extent to which widows and widowers are resilient

Appendix A. Applying and Comparing Theories

- New: The five major theoretical perspectives introduced in Chapter 1 (the evolutionary, psychoanalytic, cognitive-developmental, learning, and bioecological perspectives) and discussed further in later chapters are applied to the same topic: sexual risk behavior in adolescence

Appendix B. Careers in Human Development

- Updates to our guide to development-related careers involving research, teaching, and practice

Chapter Organization

The chapters of this book use a consistent format and contain the following:

- A chapter outline that orients students to what lies ahead
- A chapter opener that engages student interest
- Introductory material that lays out the plan for the chapter and introduces key concepts, theories, and issues relevant to the area of development to be explored
- Learning objectives at the start of each major numbered section
- Developmental sections (in Chapters 4–16) highlighting four developmental periods: infancy, childhood, adolescence, and adulthood
- Checking Mastery and Making Connections questions after each major section
- A Chapter Summary reviewing the chapter's main messages
- A Key Terms section listing new terms introduced in the chapter in the order in which they were introduced and with the page number on which they were introduced. Printed in blue, bold font, **key terms** are defined when they are first presented in a chapter and are included in the glossary at the end of the book.

Supplements

The 10th edition of *Life-Span Human Development* is accompanied by an outstanding array of supplements for both the instructor and the student that are intended to enrich the student's learning experience inside and outside the classroom. All the supplements have been thoroughly revised and updated. We invite instructors and students to examine and take advantage of the teaching and learning tools available. This collection of book-specific lecture and class tools is available online via www.cengage.com/login. Access and download PowerPoint presentations, Instructor's Manual, Test Bank, and more.

Online Instructor's Resource Manual

This detailed manual provides everything you need to prepare for and teach your course, including course guidelines, in-class exercises, and chapter objectives to assist instructors in teaching the course.

Online PowerPoint® Lecture

Helping you make your lectures more engaging while effectively reaching your visually oriented students, these handy Microsoft PowerPoint slides outline the chapters of the main textbook in a classroom-ready presentation. The PowerPoint slides are updated to reflect the content and organization of the new edition of *Life-Span Human Development*.

Cognero®

Cengage Learning Testing Powered by Cognero is a flexible, online system that allows you to import, edit, and manipulate content from the textbook's Test Bank or elsewhere, including your own favorite test questions; create multiple test versions in an instant; and deliver tests from your LMS, your classroom, or wherever you want.

MindTap

MindTap for *Life-Span Human Development* creates a unique learning path that fosters increased comprehension and efficiency of learning. MindTap is a platform that propels students from memorization to mastery. It gives you complete control of your course, so you can provide engaging content, challenge every learner, and build student confidence. Customize interactive syllabi to emphasize priority topics, then add your own material or notes to the eBook as desired. This outcomes-driven application gives you the tools needed to empower students and boost both understanding and performance.

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Acknowledgments

We would like to express our continuing debt to David Shaffer, Josiah Meigs Distinguished Teaching Professor Emeritus of the University of Georgia, for allowing his child development textbook to inform the first and second editions of this book.

Producing this book required the joint efforts of Cengage Learning and SPi Global. We thank our product manager, Cazzie Reyes, for her leadership of the project, and Brett Rader, our content manager, for his superb efforts to keep the project moving, support us cheerfully throughout, and make this edition the most visually appealing and pedagogically effective edition yet. We thank Phil Scott at SPi Global for outstanding management of the book's production and Arun Sundaramoorthi for photo research. We are grateful, as well, for the able assistance of Bethany Bourgeois, art director; Nick Barrows, IP project manager; Deanna Ettinger, IP analyst; and Jessica Witczak, product assistant. We also appreciate the strong support of Tricia Salata, marketing manager.

We remain deeply indebted to sponsoring editors past—to C. Deborah Laughton, who insisted that this project be undertaken, and to Vicki Knight, who skillfully shepherded the first edition through its final stages and oversaw the second edition. Finally, Imani Jami and Peggy Stauffer deserve many thanks for their help with research and referencing.

Reviewers

We are very grateful to nine "cohorts" of reviewers for the constructive criticism and great suggestions that have helped us make each edition of this book better than the one before:

Jeanie Allen, *Drury University*
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Rebecca J. Glover, *University of North Texas*
Cheryl Hale, *Jefferson College*
Charles Harris, *James Madison University*
Karen Hartlep, *California State University–Bakersfield*
Abby Harvey, *Temple University*
Christina Hawkey, *Arizona Western College*
Jay E. Hillis, *Bevill State Community College–Brewer*
Debra L. Hollister, *Valencia Community College*
Amy Holmes, *Davidson County Community College*
Stephen Hoyer, *Pittsburg State University*
Malia Huchendorf, *Normandale Community College*
David P. Hurford, *Pittsburg State University*
Vivian Jenkins, *University of Southern Indiana*
Wayne G. Joosse, *Calvin College*

John Klein, *Castleton State College*
Franz Klutschkowski, *North Central Texas College*
Jim Korcuska, *University of San Diego*
Suzanne Krinsky, *University of Southern Colorado*
Brett Laursen, *Florida Atlantic University*
Sherry Loch, *Paradise Valley Community College*
Becky White Loewy, *San Francisco State University*
Rosanne Lorden, *Eastern Kentucky University*
Carolyn Cass Lorente, *Northern Virginia Community College–Alexandria*
Nancy Macdonald, *University of South Carolina–Sumter*
Susan Magun-Jackson, *University of Memphis*
Robert F. Marcus, *University of Maryland*
Gabriela A. Martorell, *Portland State University*
Rebecca Kang McGill, *Temple University*
Russell Miars, *Portland State University*
Ann K. Mullis, *Florida State University*
Ronald L. Mullis, *Florida State University*
Bridget C. Murphy-Kelsey, *Metropolitan State College*
Susan L. O'Donnell, *George Fox University*
Shirley M. Ogletree, *Southwest Texas State University*
Jim O'Neill, *Wayne State University*
Rob Palkovitz, *University of Delaware*
Suzanne Pasch, *University of Wisconsin–Milwaukee*
Louise Perry, *Florida Atlantic University*
Sharon Presley, *California State University–East Bay*
Mark Rafter, *College of the Canyons*
Lakshmi Raman, *Oakland University*
Marjorie Reed, *Oregon State University*
Elizabeth Rhodes, *Florida International University*
Eileen Rogers, *University of Texas–San Antonio*
Mark Runco, *California State University–Fullerton*
Pamela Schuetze, *Buffalo State College*
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1 Understanding Life-Span Human Development

There is no official birth record, but Virginia McLaurin was told she was born in 1909. You may recognize her. At age 106, she was invited to the White House for a Black History Month event and got so excited upon meeting President Barack Obama and First Lady Michelle Obama that she spontaneously broke into dance and was immortalized on YouTube dancing with the Obamas. She later said, "It was the joy of my entire life. I can die smiling now" (Itkowitz, 2016, p. B8).

Imagine what Ms. McLaurin has seen and experienced over her long life. She picked cotton in rural South Carolina as a child, married at the tender age of 13, as was common in her world, and worked as a seamstress much of her life. She lived through years of racial segregation: "Where I grew up, . . . you weren't allowed to come through the front door. We were separated completely" (Randall, 2017). Ms. McLaurin's husband died during World War II and she has since lost her son. She has a daughter in her 80s and figures she has about 50 grandchildren. She was recognized not long ago for over 20 years of service as a foster grandmother to youth in Washington, DC. And she qualified as a "super-centenarian" on her 110th birthday (Klein, 2019).

Asked about the secret to her long life, Ms. McLaurin confessed she did not know: "Cornbread, collard greens, hog heads," she guessed (Randall, 2017). One likely contributor is her positive approach to life: "I have nothing to do but be happy." Asked if she ever worries, she said, "Why? It ain't gonna help" (Itkowitz, 2016, p. B8).

This book is about the development of humans like Virginia McLaurin—and yes, you too—from conception to death. What can most of us expect over the years? How much can human development be bent this way or that by a person's life experiences? We tackle even more fundamental questions: How in the world does a single fertilized egg cell turn into a unique human being? How do genetic and environmental forces shape development? What can we do to optimize development? We also ask questions about different periods of the life span—for example, about how infants perceive the world, why preschool children say some goofy things, how bullying damages adolescents, why some college students cannot decide on a major, how being a parent affects adults, and how aging adults can age well.

In 2016, at the age of 106, Virginia McLaurin broke into a dance of joy upon meeting Barack and Michelle Obama in the White House.
Credit: American Photo Archive/Alamy Stock Photo

Do any of these questions intrigue you? Probably so, because we are all developing persons interested in ourselves and the other developing people around us. Most college students want to understand how they and those they know have been affected by their experiences, how they have changed over the years, and where they may be headed. Many students also have practical and career-related motivations for learning about human development—for example, a desire to be a good parent or boss or to pursue a career as a psychologist, counselor, teacher, doctor, nurse, physical therapist, occupational therapist, or other health or human services professional.

This introductory chapter lays the groundwork for the remainder of the book by addressing some basic questions: How should we think about development and the influences on it? What is the science of life-span development? What theories and research strategies can help us understand development? And what are some of the special challenges in studying human development?

1.1 How Should We Think about Development?

LEARNING OBJECTIVES

- Define development, aging, and their relationship to each other.
- Explain and illustrate the role played by age grades, age norms, and the social clock in making human development different in different historical, cultural, and subcultural contexts.
- Summarize the messages of the life-span perspective on development.

We begin by asking what it means to say that humans "develop" or "age" over the life span, how we can conceptualize development in different cultural and historical contexts, and what it means to adopt a life-span perspective on human development.

Defining Development

Development can be defined as systematic changes and continuities in individuals between conception and death, or from "womb to tomb." The changes can be gains, losses, or just differences from what we were like before. Continuities are ways in which we remain the same or continue to reflect our past selves.

The systematic changes and continuities of interest to students of human development fall into three broad domains:

1. **Biological/physical development.** The growth of the body and its organs, the functioning of physiological systems including the brain, physical aging, changes in motor abilities, and so on.
2. **Cognitive development.** Changes and continuities in perception, language, learning, memory, problem solving, and other mental processes.
3. **Psychosocial development.** Changes and carryover in personal and interpersonal aspects of development, involving motives, emotions, personality traits, social skills and relationships, and roles played in the family and in the larger society.

Even though developmentalists often specialize in one of these three aspects of development, they appreciate that humans are whole beings and that changes in one area affect the others. The baby who achieves the motor development milestone of crawling, for example, has new opportunities to develop her mind by pulling pans out of kitchen cabinets and to hone her social skills by trailing her parents from room to room. And the older

adult who joins an exercise group may not only become fitter but sharpen his cognitive skills and strengthen his social network.

How would you portray, as a line on a graph, typical changes from birth to old age? Many people picture tremendous positive gains in capacity from infancy through adolescence, a flat line reflecting little change during early adulthood and middle age, and a steep decline of capacities in old age. This stereotyped view of the life span is largely false, but it also has some truth in it, especially with respect to biological and physical development. Traditionally, biologists have defined **growth** as the physical changes that occur from conception to maturity. We indeed become more biologically mature and physically competent during the early part of the life span. **Biological aging** is the deterioration of organisms (including humans) that leads inevitably to their death. Biologically, then, development *does* involve growth in early life, stability in early and middle adulthood (although aging is underway), and declines associated with the now-accumulated effects of aging in later life.

Many aspects of development do not follow this "gain–stability–loss" model, however. It has become clear that development at any age involves both gains and losses. For example, although children gain many cognitive abilities as they get older, they also become, in some situations anyway, less flexible in their thinking, less open to considering unusual solutions (Gopnik et al., 2015). They also lose self-esteem and become more prone to depression (Gotlib & Hammen, 2002).

Nor should we associate aging only with loss. Although some cognitive abilities do decline over the adult years, adults age 50 and older typically score higher than young adults on vocabulary tests and on other tests of mental ability that draw on a person's accumulated knowledge (Hartshorne & Germine, 2015). In addition, people sometimes do not improve or worsen but instead just become different than they were (as when a child who once feared loud noises comes to fear hairy monsters under the bed instead, or an adult who was worried about career success becomes more concerned about her children's futures).

Development clearly means more than positive changes during infancy, childhood, and adolescence. And **aging** involves much more than biological aging or decline; it is biological/physical, cognitive, and psychosocial changes and continuities, *positive and negative*, in mature organisms (Overton, 2010). In short, *development involves gains, losses, neutral changes, and continuities in each phase of the life span, and aging is part of it.*

Conceptualizing the Life Span

Table 1.1 lists the periods that many of today's developmentalists regard as distinct. You will want to keep them in mind as you read this book because we will constantly be speaking of infants, preschoolers, school-age children, adolescents, emerging adults, and young, middle-aged, and older adults. Note, however, that the age ranges are approximate. Age is only a rough indicator of development. Improvements in standards of living and health, for example, have meant that 65-year-olds today are not as "old" physiologically, cognitively, or psychosocially as 65-year-olds a few decades ago—or as 65-year-olds in many traditional cultures today (Diamond, 2012). There are also huge differences in functioning and personality among individuals of the same age: Some adults are bedridden at age 90, whereas others are swimming laps.

The most recent addition to this list of periods of the life span is **emerging adulthood**, a transitional period between adolescence and full-fledged adulthood that extends from about age 18 to 25 or possibly as late as 29—a phase of life that many of you are in. After World War II, as jobs became more complex and required more education, more adolescents began to attend college in large numbers to prepare for work and postponed marriage and parenthood in the process (Keniston, 1970). Observing this social change, Jeffrey Arnett (2000, 2015) began to describe emerging adulthood as a distinct phase of the life span in which college-age youth spend years getting educated or trained and saving money in order to launch their adult lives. Emerging adulthood is a distinct developmental period primarily in developed countries, but the phenomenon is spreading to developing countries too, especially in cities. According to Arnett (2004), emerging adults:

- explore their identities;
- lead unstable lives filled with job changes, new relationships, and moves;
- are self-focused, relatively free of obligations to others, and therefore free to focus on their own psychological needs;
- feel in between—adult-like in some ways but not others; and
- believe they have limitless possibilities ahead.

Table 1.1 An Overview of Periods of the Life Span

Period of Life	Age Range
Prenatal period	Conception to birth
Infancy	First 2 years of life (the first month is the neonatal or newborn period)
Preschool period	2–5 (some prefer to describe as *toddlers* children who have begun to walk and are age 1–3)
Middle childhood	6 to about 10 (or until the onset of puberty)
Adolescence	Approximately 10–18 (or from puberty to when the individual becomes relatively independent)
Emerging adulthood	18–25 or even 29 (transitional period between adolescence and adulthood)
Early adulthood	25–40 years (adult roles are established)
Middle adulthood	40–65 years
Late adulthood	65 years and older (some subcategories are used, such as the young-old, old-old, and very old, based on large differences in functioning within the 65-and-older group)

What periods of the life span do these four females, representing four generations of the same family, fall in?

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Multiple-choice question: Do you think you are (a) a kid, (b) an "emerging" adult, or (c) a full-fledged adult? Why or why not? There are many ways to define adulthood. Some of our students declare themselves to be adults based solely on age, but others analyze the extent to which they are financially independent of their parents and able to manage their own lives. An analysis of U. S. Census data focused on four traditional objective markers of adulthood: leaving home, getting a job, marrying, and having a child (Vespa, 2017). In 1975, 45% of 25- to 34-year-olds in the United States had achieved all four milestones. In 2016, only 24% had. It is definitely taking longer these days to "grow up"; that is, adulthood is being postponed in modern societies (Furstenberg, 2015). Indeed, teens today are slower than teens of the 1970s to reach "teen milestones," such as dating, drinking alcohol, holding a part-time job, and driving (Twenge & Park, 2019). Thus, today's North American youth seem to be on a very slow developmental track indeed—slow to move from childhood to adolescence and slow to move from adolescence to adulthood!

Cultural Differences

Table 1.1 represents only one view of the periods of the life span. Age—like gender, race, and other significant human characteristics—means different things in different societies (Fry, 2009). **Culture** can be defined as the shared understandings and way of life of a people (see Mistry & Dutta, 2015; Packer & Cole, 2015). It includes shared knowledge, beliefs, values, and practices concerning what humans in different phases of the life span are like, what children need to learn to function in their society, and how people should lead their lives over adulthood. We all participate in a culture; we contribute to it and it becomes part of us, influencing how we live and how we experience our lives. Different cultures can put children on quite different developmental pathways.

Each culture has its own ways of carving up the life span and of treating the people in different age groups. Each socially defined age group in a society—called an **age grade**—is assigned different statuses, roles, privileges, and responsibilities. Separating children into grades in school based on age is one form of age grading. Just as high schools have "elite" seniors and "lowly" freshmen, whole societies are layered into age grades.

Our society, for example, grants "adults"—18 years old by law in the United States for most purposes—a voting privilege not granted to children. Legal definitions of the boundary between adolescence and adulthood vary, however (Settersten, 2005). In most states in the United States, the legal age for marrying is lower than the legal ages for voting or serving in the military, and the right to drink alcohol is granted last, commonly at age 21. Cultures differ not only in the age grades they recognize but in how they mark the transition from one age grade to another. A **rite of passage** is a ritual that marks a person's "passage" from one status to another, most often the transition from childhood to adulthood. Rites of passage can involve such varied practices as body painting, circumcision, beatings, instruction by elders in adult sexual practices, tests of physical prowess, and gala celebrations (Schlegel & Barry, 2015). Japan has a clear rite of passage for 20-year-olds. In North America, Jewish youth experience a rite of passage when they have their *bar* or *bat mitzvahs*, and 15-year-old Hispanic American girls in some communities participate in a *quinceañera* (meaning "fifteen years ceremony") to signify that they have become women. Other than binge drinking on their 21st birthday, many youth in North America and other diverse modern societies do not have a clear rite of passage to tell them that they are adults (Schlegel & Barry, 2015).

How do different cultures define old age? We seem to define the boundary between middle age and old age as age 65, although there is no longer a mandatory retirement age and the ages at which people become eligible for Medicare, Social Security

Each January 15 in Japan, 20-year-olds are officially pronounced adults in a national celebration and enter a new age grade. Young women receive kimonos, young men receive suits, and all are reminded of their responsibilities to society. Young adults also gain the right to drink, smoke, and vote. The modern ceremony grew out of an ancient one in which young samurai became recognized as warriors (Reid, 1993). The age-grading system in Japanese culture clearly marks the beginning of adulthood with this rite of passage. AP Images/Shizuo Kambayashi

benefits, and "senior discounts" at restaurants and stores differ. The !Kung San of Botswana often don't know people's chronological ages and define old age instead in terms of functioning (Rosenberg, 2009). They distinguish between the *na* or "old" (an honorary title meaning "big and great" granted to all older people starting at around age 50); the "old/dead" (older but still able to function); and the "old to the point of helplessness," who are ailing and need care.

Once a society has established age grades, it defines what people should and should not do at different points in the life span (Elder & Shanahan, 2006). According to pioneering gerontologist Bernice Neugarten and her colleagues (1965), these expectations, or **age norms**, are society's way of telling people how to act their age. In our culture, for example, most people agree that 6-year-olds are too young to date or drink beer but are old enough to dress themselves and attend school. We also tend to agree that adults should think about marrying around age 25 (although in some segments of society earlier or later is better) and should retire around age 65 (Neugarten et al., 1965; Settersten, 1998). In less industrialized countries, age norms often call for starting work in childhood, marrying and having children in one's teens, and stopping work earlier than age 65 in response to illness and disability (Juárez & Gayer, 2014; Shanahan, 2000).

Why are age norms important? Because humans are social animals who like to fit in, age norms influence what we do when in life. They are the basis for what Neugarten (1968) called the **social clock**—a person's sense of when things should be done and when he or she is ahead of or behind the schedule dictated by age norms. Prompted by the social clock, for example, an unmarried 30-year-old may feel that he should propose to his girlfriend before it is too late, or a 70-year-old who loves her job may feel she should start planning for retirement. However, age norms in our society have been weakening for some time. It's less clear now what one should be doing at what age, and we see people take steps like marrying and retiring at a wide range of ages (Settersten & Trauten, 2009). Witness Madonna adopting a child at 50 or Elton John becoming a first-time father at 62 (Mayer, 2011).

Subcultural Differences

Age grades, age norms, and social clocks differ not only from culture to culture but also from subculture to subculture. Our own society is incredibly diverse with respect to race and **ethnicity**, or people's affiliation with a group based on common heritage or traditions. It is also diverse with respect to **socioeconomic status (SES)**, or standing in society based on such indicators as occupational prestige, education, and income. African American, Hispanic American, Native American, Muslim American, Asian American, and European American individuals, and individuals within these groups of high and low SES, sometimes have very different developmental experiences. We must be careful not to overgeneralize.

To illustrate, age norms often differ in higher-SES and lower-SES communities: Youth from lower-income families tend to reach milestones of adulthood earlier and feel like adults sooner (Benson & Elder, 2011; Elder & Shanahan, 2006). For example, as in many low-income communities around the world, it is common for females to become mothers in their teens and for grandmothers, older children, and other kin and neighbors to share child care responsibilities with them (Keller & Chaudhary, 2017).

Perhaps the most important message about SES is that, regardless of race and ethnicity, poverty can be very damaging to human development (see Chapter 14). The United States in recent decades has experienced ever greater income inequality and has one of the largest gaps between the rich and the poor among the wealthy nations of the world (Odgers & Adler, 2018). Almost one in five children—and more like one in three children of color—lives in poverty (Koball & Jiang, 2018). Parents and children struggling with poverty typically experience more stress than higher-SES parents and children, owing to noise, crowding, family disruption, hunger, exposure to violence, and other factors (Evans & Kim, 2013). Under these conditions, parents may have difficulty providing a safe, stable, stimulating, and supportive home environment for their children (Duncan et al., 2015). As a result, the developmental trajectories of children who grow up in poverty differ from those of children who grow up in affluence. There are measurable differences in brain development between

Although medieval children were pressured to abandon their childish ways as soon as possible and were dressed like miniature adults, it is doubtful that they were really viewed as such. Still, the modern concept of children as innocents to be nurtured and protected did not begin to take hold until the 17th century. PAINTING/Alamy Stock Photo

high- and low-SES children that are linked to lower school achievement among low-SES children (Rosen et al., 2018). The negative impacts of childhood poverty also show themselves in poorer physical and mental health and well-being—not just in childhood but in adulthood (Aizer, 2017; Evans, 2016; Odgers & Adler, 2018). Culture, subculture, and SES matter.

Historical Changes

The nature and meanings of periods of the life span also change from one historical period to another. In Europe and North America, they have evolved along these lines:

- **Childhood as an age of innocence.** Not until the 17th century in Western cultures did children come to be viewed as distinctly different from adults, as innocents to be protected and nurtured. In medieval Europe (A.D. 500–1500), for example, 6-year-olds were dressed in miniature versions of adult clothing, treated much like adults under the law, and expected to contribute to the family's survival as soon as possible (Ariès, 1962). Today the goal in most Western families is for children to be happy and self-fulfilled rather than economically useful (Stearns, 2015).
- **Adolescence.** Not until the late 19th century and early 20th century was **adolescence**—the transitional period between childhood and adulthood that begins with puberty and involves significant physical, cognitive, and psychosocial changes—given a name and recognized as a distinctive phase of the life span (Kett, 1977). As farming decreased and industrialization advanced, laws were passed restricting child labor, making schooling compulsory, and separating youths attending school from the adult world until they were educated enough to work.
- **Emerging adulthood.** As you saw earlier, the transition period from adolescence to adulthood has become so long in modern societies that a new period of the life span, *emerging adulthood*, has been defined.

Today's older adults are healthier, wealthier, and more educated than older adults of previous generations. However, as more of them reach advanced ages, they will need more services from people trained in gerontology and geriatrics.

Ariel Skelley/DigitalVision/Getty Images

- **Middle age as an emptying of the nest.** Middle age became a more distinct life phase in the 20th century as parents began to bear fewer children and live long enough to see their children grow up and leave home (Moen & Wethington, 1999).
- **Old age as retirement.** Not until the 20th century did our society come to define old age as a period of retirement. In earlier eras, those adults who survived to old age literally worked until they dropped. Starting in the last half of the 20th century, thanks to Social Security, pensions, Medicare, and other support programs, working adults began to retire in their 60s with many years ahead of them (Schulz & Binstock, 2006).

Projecting the Future

What will the life span look like in the future? In the early 21st century, the average **life expectancy** (the average number of years a newborn who is born now can be expected to live) in the United States is almost 79 years—76 for males, 81 for females—compared with 47 years in 1900 (National Center for Health Statistics, 2015). Females can expect a few more years of life than males in every country. The longest lived people on Earth are the women of Japan, whose life expectancy at birth is 87, compared to 81 for Japanese men (World Health Organization, 2018). The percentage of Japanese people who are over age 65 has climbed to 27.7% and Japan is struggling to support its graying population (Reid, 2018). Other Asian countries such as Singapore and South Korea, as well as several European countries and Canada, also have higher life expectancies than the United States. Worse, life expectancy at birth in the United States has been declining a bit since 2015 after years of increasing steadily. Why? It appears to be related to the opioid epidemic and a rise in "diseases of despair" associated with drug overdoses, suicides, and alcoholism (Bernstein & Ingraham, 2017). The COVID-19 pandemic in 2020 has not helped.

The shortest life expectancies in the world are in Sub-Saharan African countries, with Sierra Leone at the bottom of the list with a life expectancy of only 52 for males and 54 for females (World Health Organization, 2018). Lives in these African countries are shortened by widespread poverty and disease, including the HIV/AIDS epidemic. Overall, we see a strong influence of whether a nation is wealthy or poor on longevity.

By 2030, when most members of the baby boom generation will have retired, adults 65 and older will represent not the 13% of the U.S. population they represented in 2010 but over 20%, including many people in their 80s and 90s coping with serious chronic health conditions and disabilities (Ortman et al., 2014). As a result, an increasingly large group of older adults will depend on a smaller generation of working adults to support them. Although these elders will be healthier, wealthier, and better educated on average than the generations that preceded them, they will also need many services—and health and mental health professionals trained in **gerontology**, the study of aging and old age, to serve them. There will also be large disparities in health and well-being between older adults who are well educated and wealthy and those who are not (Antonucci et al., 2016).

How will policymakers deal with these societal changes? Will Social Security and Medicare be cut? Will young adults

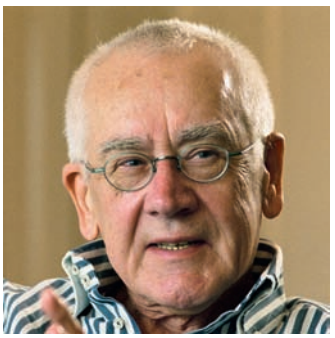
develop resentful attitudes toward aging adults? The "graying of America," and indeed of the world's population—along with societal changes we cannot yet anticipate—will undoubtedly make the aging experience by the end of the 21st century different than it is today. Meanwhile, as family life continues to evolve away from marriages that last for a lifetime and becomes less stable, children in advantaged families will have even greater advantages over those in disadvantaged families (Berger & Carlson, 2020; see Chapter 14). Will the basic needs of all children for nutrition, health care, child care, and education be met in the 21st century?

In sum, age—whether it is 7, 17, or 70—is associated with different meanings and experiences in different historical eras and in different societies. The broader message is clear: *We must view development in its historical, cultural, and subcultural context*. We must bear in mind that each social group settles on its own definitions of the life span, the age grades within it, and the age norms appropriate to each age range, and that each social group experiences development differently. We must also appreciate that in Western cultures it was only in the 17th century that children came to be seen as innocents; in the late 19th century that adolescence emerged as a distinct phase; and in the 20th century that our society recognized emerging adulthood, a middle-age "empty nest" period, and an old-age retirement period.

The Life-Span Perspective

A few decades ago, human development was viewed as something that happened in infancy, childhood, and adolescence, that proceeded through universal stages, and that led toward one outcome: mature adult functioning. In the 1960s and 1970s, however, a very different view, a **life-span perspective** on human development began to emerge, inspired by the more complex nature of adult development and aging. Gerontologist Paul Baltes (1939–2006) laid out seven key assumptions of this life-span perspective (Baltes, 1987; see also Baltes et al., 2006). These are important themes that you will see echoed throughout this book. We hope you will adopt a life-span perspective on human development yourself.

1. **Development is a lifelong process.** Today's developmentalists appreciate that human development is not just "kid stuff," that we change throughout the life span. They also believe that development in any period of life is best seen in the context of the whole life span. For instance, our understanding of adolescent career choices is bound to be richer if we know how those choices took shape during childhood and whether and how they affect adult career decisions and success.
2. **Development is multidirectional.** Today's developmentalists recognize that development does not all lead in one direction, toward mature functioning; they appreciate that different capacities show different patterns of change over time. For example, some intellectual abilities peak in adolescence whereas others do not peak until a person's 50s or so; some decline in late adulthood, some don't change much, and some, such as command of vocabulary, continue to improve (Hartshorne & Germine, 2015; see Chapters 6, 7, and 8). Different aspects of human functioning have different trajectories of change.



Developmentalist Paul Baltes is credited with encouraging adoption of a life-span perspective on development.
Christine Windbichler

3. **Development involves both gain and loss.** Building on the theme that development is multidirectional and especially on the idea that it is not all gain in childhood and loss in old age, Baltes maintained that both gain and loss are evident in each phase of the life span. In fact, he argued that gain inevitably brings with it loss of some kind, and loss brings gain—that gain and loss are linked. Examples? As infants become more able to discriminate the sounds of the language they hear spoken around them, they lose their early ability to discriminate sounds used in other languages of the world (Werker et al., 2012; see Chapter 5). Similarly, choosing to perfect one set of skills in your education or career or leisure time often means letting other skills slide.
4. **Development is characterized by lifelong plasticity**. **Plasticity** refers to the capacity to change in response to experience, positive or negative. Developmental scholars have long appreciated that child development can be damaged by a deprived environment and optimized by an enriched one. It is now understood that this plasticity continues into later life—that the aging process is not fixed but rather can take many directions depending on the individual's environment and experiences. We see proof of that every day: Many older adults retain their intellectual abilities and even enhance them with the help of physical exercise, good nutrition, a mentally and socially active lifestyle, or training designed to improve specific cognitive skills (Hertzog et al., 2009; Park et al., 2014; see Chapter 8). Such cognitive benefits are rooted in **neuroplasticity**, the brain's remarkable ability to change in response to experience throughout the life span (see Chapter 4).
5. **Development is shaped by its historical-cultural context.** This theme, already highlighted in our discussion of historical and cultural influences on development, is illustrated beautifully by the pioneering work of Glen Elder and his colleagues on how the Great Depression of the 1930s affected the later life courses of the era's children and adolescents (Elder, 1998; Elder et al., 1984). A few years after the stock market crashed in 1929, one in three workers was unemployed and many families were tossed into poverty. This economic crisis proved to be especially difficult for children if their out-of-work and demoralized fathers became less affectionate and less consistent in disciplining them. When this happened, children displayed behavior problems and had low aspirations and poor records in school. They turned into men who had erratic careers and unstable marriages and women who were seen

The creation of the Internet is a historical change with many implications for the social lives of teens and for human development more generally. Rawpixel.com/Shutterstock.com

by their own children as ill tempered. Might the COVID-19 pandemic have similar effects on some of today's families?

6. **Development is multiply influenced.** Today's developmental scientists believe that human development is the product of many interacting causes, both inside and outside the person, both biological and environmental in nature. Put another way, development is the outcome of ongoing interactions between a changing person and her changing world.
7. **Development must be studied by multiple disciplines.** Because human development is influenced by everything from biochemical events in cells to historical changes, it is impossible for one discipline to have all the answers. A full understanding of human development will come only when many disciplines, each with its own perspectives and tools of study, join forces. Not only psychologists but also biologists, neuroscientists, historians, economists, sociologists, anthropologists, and many others have something to contribute to our understanding. Some universities have established interdisciplinary human development programs that bring members of different disciplines together to forge more integrated perspectives on development.

In sum, Baltes's modern life-span perspective assumes that development occurs throughout the life span, is multidirectional, involves gains and interlinked losses at every age, is characterized by plasticity, is affected by its historical and cultural context, is influenced by multiple, interacting causes, and is best studied by multiple disciplines.

Checking Mastery

1. What is the difference between an age grade and an age norm?
2. When is the "emerging adulthood" phase of the life span and why has it come into existence?
3. What are two positive messages about old age in the seven themes of the life-span perspective?

Making Connections

1. Many observers, starting with Bernice Neugarten, believe that age norms for transitions in adult development such as marriage, parenthood, the peak of one's career, and retirement have weakened in our society. Do you think such age norms could ever disappear entirely? Why or why not?
2. Create examples to show how three of the assumptions of the life-span perspective might apply to your development.

1.2 What Theories Have Guided the Science of Life-Span Development?

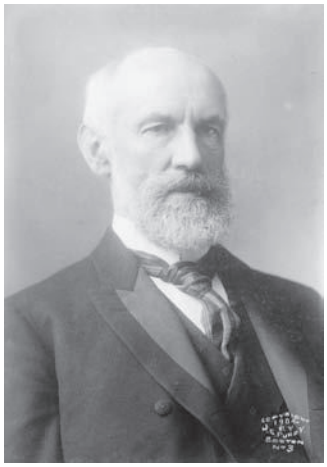
LEARNING OBJECTIVES

- Describe how the study of human development began.
- Explain three major issues addressed by theories of human development.
- Compare and contrast the main ideas of the five theoretical perspectives that have dominated the study of development: evolutionary, psychoanalytic, learning, cognitive-developmental, and bioecological systems theories.

If development consists of systematic changes and continuities from conception to death, the science of development consists of theorizing about and studying these changes and continuities and their causes. In this section we consider the origins of the science of life-span development, the issues it addresses, and the main theories that have attempted to address those issues.

Early Beginnings

Although philosophers have long expressed their views on the nature of humans and the proper methods of raising children, it was not until the late 19th century that the first scientific investigations of human development were undertaken. Several scholars



G. Stanley Hall, regarded as the founder of developmental psychology and first president of the American Psychological Association, did pioneering research on childhood, adolescent "storm and stress," and old age.

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began to carefully observe the growth and development of their own children and to publish their findings in the form of **baby biographies**. The most influential baby biographer was Charles Darwin (1809–1882), who made daily records of his son's development (Darwin, 1877). Darwin's curiosity about child development stemmed from his interest in evolution. He believed that infants share many characteristics with their nonhuman ancestors and that understanding the development of the embryo and child can offer insights into the evolution of the species. Darwin's evolutionary perspective strongly influenced early theories of human development, which emphasized universal, biologically based maturational changes (Parke et al., 1994).

Darwin greatly influenced the man most often cited as the founder of developmental psychology, American G. Stanley Hall (1846–1924; see Lepore, 2011). Hall (1891) invented a now all-too-familiar tool, the questionnaire, to study children's thinking. Inspired by evolutionary theory, Hall (1904) characterized adolescence as a transitional time of emotional ups and downs and rapid changes—a time of **storm and stress**—a view that has enough truth to still be with us (see Chapter 15). Hall capped his remarkable career by turning his attention to old age and an analysis of how society treats (or, really, mistreats) its older members. As developmental science evolved, its ideas evolved too.

The Nature of Theories

Scientists need theories to guide them. A **theory** is a set of ideas proposed to describe and explain certain phenomena—in this book, human development. In science, it is not enough simply to catalog facts without organizing this information around some set of concepts and propositions. Researchers would soon be overwhelmed by trivia and would lack "the big picture." A theory of human development provides needed organization, offering a lens through which researchers can interpret and explain any number of specific facts or observations. A theory also guides the collection of new facts or observations, making clear

- what is most important to study,
- what can be hypothesized or predicted about it,
- how it should be studied, and
- how findings should be interpreted.

Because different theorists often have very different views on these critical matters, what is learned in any science greatly depends on which theoretical perspectives become most influential.

Contrary to what some people think, theories are not just speculations, hunches, or unsupported opinions. A good scientific theory should be:

- **Falsifiable.** It can be proved wrong; that is, it is specific enough that it can generate specific predictions (hypotheses) that can be tested through research and either supported or not supported by the data collected. If a theory is vague, it cannot be tested and will not be useful in advancing knowledge.
- **Supported by data.** A good theory should help us better describe, predict, and explain human development; that is, its predictions should be confirmed or supported by research results. It should be revised or abandoned if it does not fit the facts of development.

The Issues Theories of Development Address

Developmental theorists—and people in general—grapple with at least three key developmental issues when they think about human development (Lerner et al., 2015; P. H. Miller, 2016; Newman & Newman, 2016): nature–nurture, continuity–discontinuity, and universality–context specificity. All of us hold some basic beliefs about human development. What are yours? We invite you to look at ● **Table 1.2** to start thinking about it. The stands you take on these issues by the end of the course will influence how you view the developing humans in your personal and professional lives.

The three questions in Table 1.2 lay out the three issues in human development that follow. Reading this book will make you more aware of your own assumptions about human development and how they compare with those of major theorists.

● **Table 1.2** Issues in Human Development

Issue	Description
1. Nature–nurture	Is development primarily the product of genes, biology, and maturation—or of experience, learning, and social influences?
2. Continuity–discontinuity	Do humans change gradually and in quantitative ways—or do they progress through qualitatively different stages and develop very different competencies and characteristics as they get older?
3. Universality–context specificity	Is development similar from person to person and from culture to culture—or do pathways of development vary considerably depending on the social context?

Nature–Nurture

Understanding human development means grappling with *the* major issue in the study of human development—the **nature–nurture issue**, or the question of how biological forces and environmental forces act and interact to make us what we are (see Goldhaber, 2012).

By "nature," we mean such influences as heredity, universal maturational processes guided by the genes, biologically based predispositions produced by evolution, and biological influences such as hormones, neurotransmitters, and other biochemicals. To those who emphasize nature, some aspects of development are inborn or innate or are the product of **maturation**, a biological unfolding of body and brain as sketched out in the genes (the hereditary material passed from parents to child at conception). According to a strong nativist view, just as seeds turn into mature plants through a predictable process, humans "unfold" within the womb, assuming that they receive the necessary nourishment from their environment. Their human genetic code then makes it likely that they will walk and utter their first words at about 1 year of age, achieve sexual maturity between 10 and 14, and gray in their 40s and 50s. Maturational changes in the brain contribute to cognitive changes such as increased memory and problem-solving skills and to psychosocial changes such as increased understanding of other people's feelings. Genetically influenced maturational processes guide all of us through many of the same developmental changes at about the same points in our lives. Meanwhile, *individual* hereditary endowment is making each person's development unique.

By "nurture," we mean changes that are influenced primarily by the **environment**—all the physical and social conditions, stimuli, and events that can affect us, from the prenatal biochemical environment of the womb, to crowded living quarters and polluted air or climate change, to social interactions with family members, peers, and teachers, to the neighborhood and broader cultural context in which we develop. We know that the physical environment matters—for example, that exposure to lead in the paint in old buildings or in water pipes can stunt children's intellectual development for life. And we will see countless examples in this book of how the social environment—the behavior of other people—shapes development. Nurture works in part through **learning**—all the processes through which experience brings about relatively permanent changes in thoughts, feelings, or behavior. A certain degree of physical maturation is clearly necessary before a child can dribble a basketball, but instruction and long, hard hours of practice are just as clearly required if the child is to excel in basketball.

● **Table 1.3** summarizes the terms of the nature–nurture issue. Some theorists emphasize nature more, others emphasize nurture more. But let's settle the nature–nurture debate right now: *All developmental changes are the products of a complex interplay between nature and nurture.* It is not nature *or* nurture; it is nature *and* nurture (Knopik et al., 2017). There would be no development without both. To make matters more complex, it is nature affecting nurture and nurture affecting nature to the point that we really can't separate the two. For example, biology (nature) may provide us with a basic design for a human brain but from the start experience (nurture) helps construct our brains by affecting its neural connections. Experience can even change the influence of genes by activating or deactivating them (see Chapter 2 on epigenetic effects). Much of the excitement of studying human development comes from trying to understand the various ways in which these two forces combine to make us what we are and become. We'll revisit nature-nurture questions throughout this book.

● **Table 1.3** The Language of Nature and Nurture

Nature	Nurture
Heredity	Environment
Maturation	Learning
Genes	Experience
Innate or biologically based predispositions	Cultural influences

Continuity–Discontinuity

Do you believe that humans change gradually along a developmental path, or do you believe humans sometimes change abruptly and more dramatically? The **continuity–discontinuity issue** focuses in part on whether each of us is likely to continue to show later in life characteristics we displayed earlier in life (e.g., high intelligence or shyness or irritability) or whether we may become very different people years from now. The continuity-discontinuity issue also concerns whether any changes people undergo over the life span are gradual or abrupt. Continuity theorists view human development as a process that occurs in small steps, as when school-age children gradually gain weight from year to year. In contrast, discontinuity theorists tend to see more abrupt changes, such as when an adolescent boy rapidly shoots up 6 inches in height, gains a bass voice, and grows a beard.

Similarly, continuity theorists see quantitative changes, changes in *degree* or amount: a person grows taller, knows more vocabulary words, gains more wrinkles, or interacts with friends less frequently. By contrast, discontinuity theorists see qualitative changes, changes in *kind*, changes that make the individual fundamentally different in some way. The transformations of a caterpillar into a butterfly rather than just a big caterpillar, of a nonverbal infant into a toddler who uses language, or of a prepubertal child into a sexually mature adolescent are examples of qualitative changes.

Discontinuity theorists often propose stages of development. A **stage theory** lays out a sequence of distinct phases of development, each characterized by a particular set of abilities, motives, emotions, or behaviors that form a coherent pattern. Development is said to involve transitions from one stage to another, each stage being qualitatively different from the stage before or the stage after. Thus, the adolescent may be able to grasp abstract concepts like human rights and social justice in a way that the school-age child cannot, or the middle-age adult may be said to be concerned with fundamentally different life issues than the young adult or older adult.

Only cross-cultural research can tell us whether the findings of research conducted in the United States and other Western societies hold true for developing humans in cultures very different from ours—that is, whether there is universality or context-specificity in development. yoh4nn/iStock Unreleased/Getty Images

Universality–Context Specificity

Finally, developmental theorists often disagree on the **universality–context-specificity issue**—or the extent to which developmental changes are common to all humans (universal) or are different across cultures, subcultures, or other context (context specific). Stage theorists typically believe that the stages they propose are universal—for example, that virtually all children enter a new stage in their cognitive development as they enter adolescence. From this perspective, development proceeds in certain universal directions.

But other theorists believe that human development is far more varied than this because it is so influenced by environmental or contextual factors. Paths of development followed in one culture may be quite different from paths followed in another culture (or subculture, neighborhood, or even situational context). For example, preschool children in the United States sometimes believe that dreams are real but give up this belief as they get older. By contrast, children raised in the Atayal culture of Taiwan have been observed to become more and more convinced as they get older that dreams are real, most likely because that is what adults in their culture believe (Kohlberg, 1966b). The issue is this: How alike—or how diverse—are the developmental pathways we travel?

As you encounter major theories of human development, notice what stands they take on the nature–nurture, continuity–discontinuity, and universality–context-specificity issues.

Influential Developmental Theories

In this book, you will encounter five major theoretical viewpoints, each with important messages about human development, some of which you are already familiar with. We preview them briefly here: evolutionary theory, psychoanalytic theory, learning theories, cognitive-developmental theory, and bioecological systems theory.

Evolutionary Theories

Developmental science was inspired into being at the end of the 19th century by Darwin's (1859) theory of evolution; today, evolutionary thinking has made a major comeback. Modern **evolutionary psychology**, rooted in Darwin's theory, is examined in Chapter 2 on genes and environment and comes into play in other chapters as well. This perspective looks to the evolution of the human species for explanations of why humans are as they are and develop as they do (Bjorklund et al., 2016; Buss, 2019; Tomasello, 2019). Evolutionary theorists ask fundamental questions about how characteristics and behaviors we commonly observe in humans today may have evolved—that is, how they may have helped our ancestors adapt to their environments, allowing them to survive, reproduce, and therefore pass on genes associated with those adaptive qualities to their children. Examples of adaptive behaviors include forming close parent–infant attachments that protect the young from harm; attachment theory, examined fully in Chapter 13, had its roots in evolutionary theory. And Chapter 12 explores how humans evolved to devise and follow norms, rules, and laws that foster adaptive cooperation among members of a society.

You may think evolutionary theory is all about nature—about genetic makeup—but evolutionary developmental theorists see both nature and nurture at work in evolution. This is because the genetic makeups that prove advantageous in one kind of environment—for example, a harsh environment that demands strength and aggression—may not be advantageous in a different environment—for example, a safer environment that encourages helping and collaboration. How any species evolves, develops, and behaves depends on the kind of environment to which its members must adapt. Evolutionary developmental theorists look at behaviors like children's play or teenagers' dating behavior and ask fundamental questions about why they do what they do, how their behavior might have evolved, and how it contributes to their development and to their longer-term adjustment. We gain many insights from looking at human development in its evolutionary context.

Psychoanalytic Theory

Everyone knows something about Sigmund Freud (1856–1939) and his **psychoanalytic theory** with its focus on the development and inner dynamics of the personality (conflicts between the id, ego, and superego), its maturational stages of psychosexual development (oral, anal, phallic, latency, and genital), its concept of unconscious motivation, and its defense mechanisms to combat inner conflicts and anxieties (Freud, 1933). Freud's influence has waned now but some of his insights have profoundly influenced thinking about human development, personality, and psychotherapy. For example, we can credit Freud with calling attention to unconscious processes and motivations underlying behavior, for stressing the importance of early experiences in the family for a child's development, and for recognizing the importance of emotions and inner emotional conflicts in development.

In this book, we focus on one of Freud's influential followers, Erik Erikson (1902–1994), whose eight stages of psychosocial development are examined in Chapter 10. Erikson (1963, 1968, 1982) broadened Freud's stages of psychosexual development and

extended them beyond adolescence into early, middle, and late adulthood. He described a major developmental issue or conflict humans must confront at each of eight phases of life, building on Freud's ideas about inner personality dynamics involving the id, ego, and superego. Erikson is most known for his exploration of the issue of identity versus role confusion—of figuring out who you are—in adolescence. Like Freud, he viewed his stages as universal but, believing that nature and nurture interact to produce development, he also appreciated, more than Freud, that the stages could play out differently in different families and cultures. Erikson has had major impacts by devising one of the only stage theories covering the whole life span and calling attention to significant developmental issues at each of its phases.

Learning Theories

Standing firmly on the nurture side of the nature–nurture issue, learning theorists believe that learning is a major contributor to human development. Major contributors to early learning theories such as Ivan Pavlov, John Watson, and B. F. Skinner have contributed greatly to our understanding of how humans change through their learning experiences. Chapter 7 explores how B. F. Skinner (1904–1990) revolutionized understanding of learning through his studies of *operant conditioning* (also called instrumental conditioning). His explanations of how the consequences of behavior (whether it is reinforced or punished) affect whether the behavior is likely to continue have helped countless parents and teachers learn to reinforce, through tactics such as praise, the behavior they want from children—not the behavior they wish would stop.

Chapter 7 also discusses Albert Bandura (1925–) and his modern **social learning theory** (also called *social cognitive theory*). This perspective draws on the work of Skinner and other early learning theorists but highlights that we humans, unlike the lab rats studied by Skinner, are thinking beings who anticipate rewards, reinforce and punish ourselves, and store information in memory about what we observe for later use. Most importantly, Bandura emphasized the importance of observational learning and demonstrated that we humans learn a huge amount not by experiencing the consequences of our own behavior but by watching and learning from the behavior of other people and the consequences that follow it. To early learning theorists like Skinner and modern social learning theorists like Bandura, development boils down to learning. There are no stages; development can take any number of directions and proceed at any number of rates depending on the individual's learning experiences. Although learning principles operate universally, the outcomes of learning can differ widely from culture to culture.

Cognitive-Developmental Theory

Another giant in the study of human development is Jean Piaget (1896–1980), who will star in Chapter 6 when we explore his **cognitive-developmental theory**. Piaget (1950, 1952) laid out a very detailed stage theory of cognitive development. He believed that, through a combination of maturation and experience acting on the world around them, children "construct" more advanced modes of thinking that progress through four qualitatively different and universal stages (sensorimotor, preoperational, concrete operational, and formal operational). Piaget and his colleagues demonstrated that infants think directly through their senses and actions until they gain the capacity to think using symbols such as words and images in their heads. He then showed how thinking becomes more logical in the elementary school years and more abstract and hypothetical in adolescence. Main message: Children think differently than adults do. Piaget's theory has had huge impacts not only on the study of cognitive development but on the study of social development. As Chapters 6 and 7 make clear, though, other views of cognitive development—for example, Vygotsky's sociocultural perspective and the information-processing perspective—have also become influential.

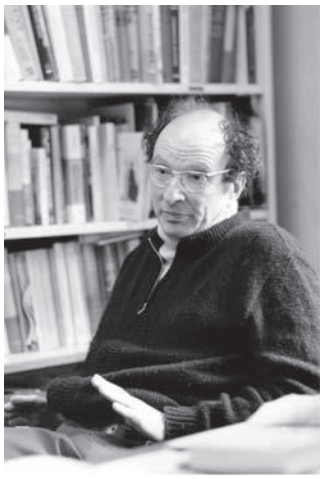
Bioecological Systems Theory

Finally, here we introduce in a bit more detail an influential modern perspective that will give you a sense of what developmental scientists have learned over the years about the complexities of human development. **Systems theories** of development generally claim that changes over the life span arise from ongoing transactions in which a changing person and a changing environment affect one another (see, e.g., Lerner, 2006; Newman & Newman, 2016). The individual and the physical and social environments with which he interacts are inseparable parts of a larger system in which everything affects everything else. Development can take a variety of paths, and some surprising twists and turns, depending on this complex interplay of multiple influences. Nature and nurture cannot be separated because they are part of a dynamic system, continually influencing one another and "co-acting" to produce development.

Early in his career, Russian-born American psychologist Urie Bronfenbrenner (1917–2005) became disturbed that many early developmental scientists were studying human development out of context, expecting it to be universal and failing to appreciate how much it could vary from culture to culture, from neighborhood to neighborhood, and from home to home. Bronfenbrenner formulated an ecological model to describe how the environment is organized and how it can affect development. He later renamed his framework a **bioecological model** of development to get the "person" (an individual with a genetic makeup and biological and psychological characteristics) back into the picture. That allowed Bronfenbrenner (1979, 1989; Bronfenbrenner & Morris, 2006) to better convey that it is the transactions between person and environment that produce development.

In Bronfenbrenner's view, the developing person is embedded in a series of environmental systems. These nested systems interact with one another and with the individual over time to influence development. The person influences her environment just as her environment influences her; there are many other bidirectional or reciprocal influences at work as well. The four environmental systems that influence and are influenced by the developing person are shown in ■ **Figure 1.1**.

1. A **microsystem** is an immediate physical and social environment in which the person interacts face-to-face with other people. The primary microsystem for a firstborn infant is likely to be the family—perhaps infant, mother, and father,



Urie Bronfenbrenner sought to understand how a person and the environmental systems in which the person is embedded interact over time to produce development.

Associated Press/AP Images

all reciprocally influencing one another. The developing child may also experience other microsystems, such as a day care center —and later schools, peer groups, workplaces, retirement communities, and the like. Today, most of us seem to live in a digital microsystem too!

2. The **mesosystem** consists of the interrelationships between two or more microsystems. What happens in one microsystem can have implications, good or bad, for what happens in another microsystem—and for development. For example, in one study teenagers from Mexican, Chinese, and European American backgrounds who experienced stressful events such as arguments in the family, one microsystem, showed increased problems of poor attendance and difficulty learning at school, a second microsystem (Flook & Fuligni, 2008). Similarly, problems at school can spill over to the family if adolescents take their bad moods home with them.
3. The **exosystem** involves social settings that individuals do not experience directly but that can still influence their development. For example, children can be affected by their parents' experiences of stress at work, by how strong their parents' social support networks are, or by what kind of neighborhood or community they live in. They can be affected by a decision by the local school board to eliminate health education from the curriculum or a decision by the police department to enforce underage drinking laws more aggressively.
4. The **macrosystem** is the larger cultural or societal context in which the person and various micro-, meso-, and exosystems are embedded. The macrosystem includes a society's cultural values, laws, political and economic systems, and institutions. To illustrate, although the United States has a high standard of living, it is not a very family-friendly culture in many ways, as Bronfenbrenner himself often lamented (Bronfenbrenner & Morris, 2006). Modern nations typically have a national policy offering paid family leave from work and sometimes cash benefits to new mothers (and often fathers too), whereas the United States is among only two countries in the world out of 185 countries that do not, the other being Papua New Guinea (International Labour Organization, 2014). Policies regarding paid family leave to care for sick children or ailing parents, affordable child care, and flexible work hours are

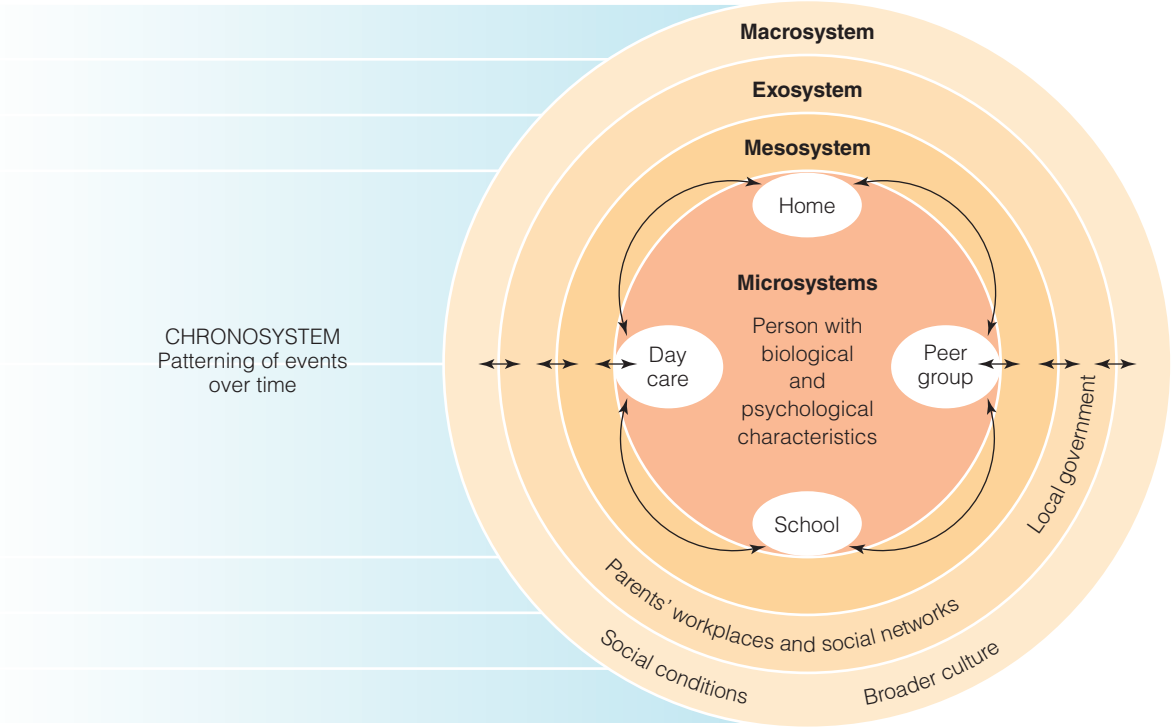


Figure 1.1 Bronfenbrenner's bioecological model of development pictures environment as a series of nested structures in which the person is embedded and which the person influences. A microsystem is an immediate environment, such as the family, in which the person interacts. The mesosystem is connections among microsystems, the exosystem is settings that affect but do not contain the individual, and the macrosystem is the broader cultural context of development. There is also the chronosystem, the patterning over time of historical and life events taking place in these systems. All the systems influence and are influenced by the developing person.

Source: Adapted from Kopp and Krakow (1982).

also far behind those of other developed countries and create challenges for many American families and their children (Berger & Carlson, 2020).

In addition to the nested series of systems (microsystem, mesosystem, exosystem, and macrosystem), Bronfenbrenner introduced the concept of the **chronosystem** (*chrono* meaning "time") to capture the idea that people and their environments and the relations between the two change over time and unfold in particular patterns or sequences. We cannot study development by taking still photos; we need video to understand how one event leads to another and how societal changes intertwine with changes in people's lives. Thus, a global crisis such as the Great Recession of 2008 or the COVID-19 pandemic of 2020 may precipitate a chain of events in a family: a husband or wife's job loss, marital conflict, and multiple changes in family relationships, parenting, and children's lives and development (see Chapter 14). Each of us functions in particular microsystems linked through the mesosystem and embedded in the larger contexts of the exosystem and the macrosystem, all in continual flux through the chronosystem. Many factors, both within and outside the person, interact to influence development.

As Bronfenbrenner (1979) continued to think about environmental influences on development, he called for studies that did more than merely compare the development of children who lived at different "social addresses"—in different cultures, in low- versus high-SES neighborhoods, in different ethnic or racial groups, and so on. He sought to understand and compare the kinds of developmentally significant social interactions and activities that were going on at these social addresses (Bronfenbrenner & Ceci, 1994).

Systems theories of development like Bronfenbrenner's bioecological model seem complex, but that is one of their greatest strengths: They capture the complexity of life-span human development. We can applaud Bronfenbrenner and other systems theorists for viewing human development as the product of many biological and environmental forces interacting within a complex system and for challenging us to study ongoing transactions between person and environment. Yet today's system theories make clear that we have our work cut out for us to understand all the many factors that influence development and the many paths that development can take.

The evolutionary, psychoanalytic, learning, cognitive-developmental, and bioecological systems perspectives are summarized in ● **Table 1.4**. And you may wish to find out, either now or at the end of the course, how these perspectives can be applied to better understand why teenagers sometimes engage in risky sexual behavior (see **Appendix A**).

● **Table 1.4** Influential Developmental Theories

Theory	Major theorists	Main messages	Stands on Issues
Evolutionary theories (see Chapters 2, 12, and 13)	Charles Darwin; modern developmental evolutionary theorists such as David Bjorklund and Michael Tomasello	Human development and behavior reflect a genetic makeup that evolved because it aided our ancestors in adapting to their environment	Nature and nurture; continuity and discontinuity (not stages but some special critical or sensitive periods); emphasis on the universal
Psychoanalytic theory (see Chapter 11)	Sigmund Freud, Erik Erikson	Humans progress through universal stages of development in which they grapple with inner psychic conflicts; Erikson expanded on Freud's thinking, extending developmental conflicts through adulthood.	Nature and nurture; discontinuity (stages with carryover from early to later personality); universal emphasis by Freud, more attention to cultural differences by Erikson
Cognitive-developmental theory (see Chapter 6)	Jean Piaget	Humans develop through four universal stages of cognitive development, progressing through the sensorimotor, preoperational, concrete operational, and formal operational stages	Nature and nurture (maturation and experience interacting with the world); discontinuity (stages); universal emphasis
Learning theories (see Chapter 7)	B. F. Skinner, Albert Bandura	Early learning theories such as Skinner's viewed development as learning—behavior shaped by the environment; Bandura's more modern social learning theory highlights the role of cognition in learning and views observational learning as the major vehicle for human learning	Nurture emphasized; continuity (strengthening or weakening of behavior); context-specificity
Bioecological systems theory	Urie Bronfenbrenner, other systems theorists	Ongoing transactions between a changing person and changing environment (microsystem, mesosystem, exosystem, and macrosystem, moving through the chronosystem) produce context-specific differences in development at different social addresses	Nature and nurture (with a nurture emphasis); continuity or discontinuity possible; context-specificity emphasized

Checking Mastery

1. What are the two meanings of discontinuity in development?
2. What would be an example of a "nature" argument and what would be an example of a "nurture" argument about why boys are more physically aggressive on average than girls?
3. What are a couple of key differences between how cognitive-developmental theorist Jean Piaget and learning theorist B. F. Skinner view development?
4. What basic question does evolutionary theory raise about development that other theories do not?

Making Connections

1. Try applying the three main issues in human development to the topic of cognitive or intellectual aging from age 50 on. What questions could you raise about nature–nurture, continuity–discontinuity, and universality–context specificity in aging?
2. You may have forgotten this because of the COVID-19 pandemic, but the United States has been experiencing an opioid epidemic for some time in which many adults are overdosing on heroin, fentanyl, and prescribed pain killers. Using Bronfenbrenner's bioecological model and its systems, hypothesize about why this has been occurring.

1.3 How Is Development Studied?

LEARNING OBJECTIVES

- Summarize the four goals of research on human development.
- Describe the scientific method and the choices involved in selecting a sample and choosing data collection methods.
- Evaluate the strengths and weaknesses of the case study, experimental, and correlational methods.
- Evaluate the strengths and weaknesses of the cross-sectional, longitudinal, and sequential designs.

How do developmental scholars test their theories and gain understanding of life-span development? Let us review for you, briefly, four key goals of science, the gist of the scientific method, and then the research strategies devised for describing, predicting, explaining, and optimizing development (see S. A. Miller, 2017). Even if you have no desire to do developmental research yourself, it is important to understand how the knowledge of development represented in this book was generated. We illustrate using examples of research investigating the implications of our digital, online environment for human development.

Goals of Studying Development

Four goals drive the study of life-span development (Baltes et al., 1980):

- Description
- Prediction
- Explanation
- Optimization.

To achieve the goal of *description*, developmentalists characterize the functioning of humans of different ages and trace how it changes with age. They describe both normal development and individual differences, or variations, in development. Although average trends in human development across the life span can be described, it is clear that no two people (even identical twins) develop along precisely the same pathways.

Description is the starting point in any science, but scientists ultimately strive to achieve their second and third goals, *prediction* and *explanation*. Developmental scientists seek to identify factors that predict development and, better yet, establish that these factors actually explain development—that is, cause humans to develop as they typically do or cause some individuals to develop differently than others. To do this, developmentalists often address nature–nurture issues.

A first step is often finding a relationship between a possible influence on development and an aspect of development—for example, a relationship between whether or not an adolescent's friends use drugs and whether or not the adolescent does. If there is a positive relationship, knowing whether an adolescent's friends use drugs allows us to *predict* whether the adolescent uses drugs. But is this a causal relationship? That's what must be established before the goal of *explanation* is achieved. Maybe it's not that friends cause adolescents to use drugs by encouraging them to use drugs. Maybe it's just that adolescents who use drugs pick friends who also use drugs (see Chapter 13 for evidence that both possibilities have some truth).

The fourth goal of developmental science, once influences on development are better understood, is the *optimization* of human development. How can humans be helped to develop in positive directions? How can their capacities be enhanced, how can developmental difficulties be prevented or overcome? Pursuing the goal of optimizing development might involve evaluating through research studies ways to stimulate intellectual growth in preschool programs, to prevent opiate addiction among young adults, or to support older adults making the often stressful move to a nursing home. To those who are or aspire to be teachers, psychologists, or other helping professionals, applied research aimed at optimizing development is especially relevant.

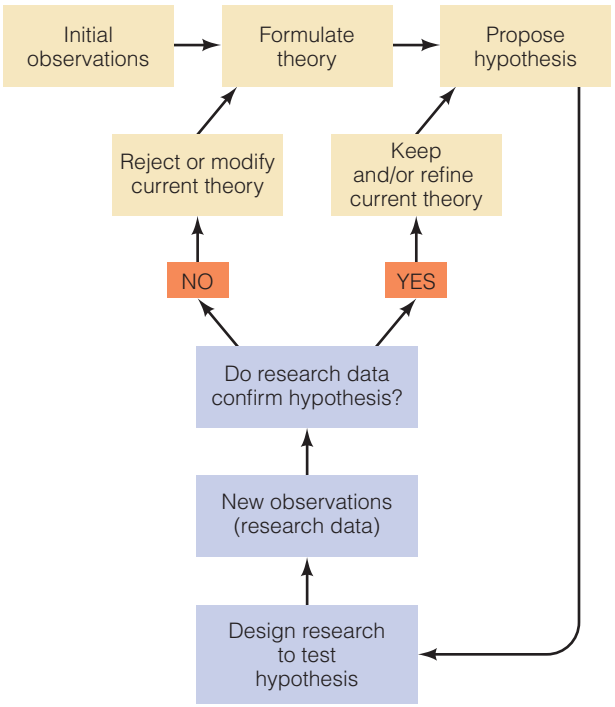
The Scientific Method

There is nothing mysterious about the **scientific method**. It is both a method and an attitude—a belief that investigators should allow facts, their systematic observations or data, to determine the merits of their thinking. For example, for every "expert" who believes that psychological differences between males and females are largely biological in origin, there is likely to be another "expert" who insists that boys and girls differ because they are raised differently. Whom should we believe? It is in the spirit of the scientific method to believe the data—the findings of research. The scientist is willing to abandon a pet theory if the data contradict it. Ultimately, then, the scientific method can help the scientific community and society at large weed out bad ideas and unfounded opinions.

The scientific method involves generating theories and testing them by making observations. Often, preliminary observations provide ideas for a theory. Jean Piaget, for instance, began formulating his influential theory of cognitive development by closely observing how French children of different ages responded to items on the Binet IQ test when he worked on the test's development, as well as by watching his own children's development (see Chapter 6).

Once developed, theories are used to generate specific predictions, or **hypotheses**, about what to expect in a study conducted to test the theory. Consider a theory claiming that psychological differences between males and females are largely caused by differences in their socialization experiences in the family. Based on this theory, a researcher might hypothesize that if parents grant boys and girls the same freedoms, the two sexes will become similarly independent, whereas if parents give boys more freedom than girls, boys will be more independent than girls. Suppose that the study designed to test this hypothesis indicates that boys turn out more independent than girls no matter how their parents treat them. Then the hypothesis would be disconfirmed by the findings, and the researcher might want to rethink this theory of gender differences or test it again in a different way. If other hypotheses based on this theory were also inconsistent with the facts, the theory would have to be significantly revised or abandoned in favor of a better theory.

This, then, is the heart of the scientific method: Theories generate hypotheses, which are tested through research studies in which observations of behavior are made, and new observations indicate which theories are worth keeping and which are not (■ **Figure 1.2**).



■ **Figure 1.2** The scientific method in action.

Sample Selection

Any study of development focuses on a particular research **sample**, the group of individuals studied, with the intention of generalizing the results to a larger **population**, a well-defined group (such as premature infants, American high school students, or Chinese elders) from which the sample is chosen and about which the researcher wants to draw conclusions. Although it is advocated more than it is used, the best approach is to study a **random sample** of the population of interest—a sample formed by identifying all members of the larger population and then, by a random means (such as drawing names blindly), selecting a portion of that population to study. Why do this? Random sampling increases confidence that the sample studied is representative of the larger population of interest and therefore that conclusions based on studying the sample will be true of the whole population.

In practice, developmentalists often draw their samples—sometimes random, sometimes not—from their local communities. Thus, researchers in Dallas, Texas, might survey students at a local high school about their drug use but then be unable to draw firm conclusions about American teenagers in general if, for example, the school is in a suburb where drug-use patterns are different than they might be in an inner-city or rural area. They would certainly be unable to generalize about Kenyan or Brazilian high school students. Researchers should describe the characteristics of the sample they studied and avoid overgeneralizing their findings to populations that might be socioeconomically or culturally different from their research sample.

Data Collection

The next challenge: We must find appropriate ways to measure what interests us. The methods used to study human development are varied, depending on the age group and aspect of development of interest (S. A. Miller, 2017). Consider three broad methods of data collection used by developmental researchers: verbal reports, behavioral observations, and physiological measurements.

Verbal Reports

Interviews, written questionnaires or surveys, ability and achievement tests, and personality scales all involve asking people questions, either about themselves (self-report measures) or about

someone else (e.g., child behavior as reported by informants such as parents or teachers). These verbal report measures usually ask the same questions in precisely the same order of everyone so that the responses of different individuals can be compared. These days, many verbal report measures are administered via websites or smartphone apps.

Although self-report and other verbal report methods are widely used to study human development, they have shortcomings:

- They typically cannot be used with infants, young children, older adults with a cognitive impairment, or other individuals who cannot read or understand speech well; informants like parents may need to provide information about them.
- Because individuals of different ages may not understand questions in the same way, age differences in responses may reflect age differences in comprehension or interpretation rather than in the quality of interest to the researcher.
- Respondents may try to present themselves (or those they are providing information about) in a positive light—a problem termed *socially desirable responding*.

Behavioral Observations

Another data collection method is observation of behavior. **Naturalistic observation** involves observing people in their everyday (natural) surroundings (S. A. Miller, 2017; Pellegrini, 1996). Ongoing behavior is observed in homes, schools, playgrounds, workplaces, nursing homes, or wherever people are going about their lives. Elisabeth McClure and her colleagues (2018), for example, observed long-distance video chats between infants and their grandparents in infants' homes, hoping to learn when babies are capable of jointly attending to an object of interest with their grandparent—for example, to look at a picture Grandma wants them to see or to hold a toy in front of the laptop screen for Grandpa to see. Two research assistants, trying to be inconspicuous as possible, recorded interactions with small, hand-held video cameras. One assistant recorded what was on the screen, the other recorded the baby and other family members. The two tapes were later synced and shown side by side on the screen so that coders could code instances of joint attention. Infants 16 months of age or older proved more able than younger infants to engage in joint attention with their grandparents, no doubt to the delight of Grandma and Grandpa.

Naturalistic observation has been used to study child development more often than adult development, largely because infants and young children often cannot be studied through self-report techniques that demand verbal skills. It is the only data collection technique that can reveal what children or adults do in everyday life. However, naturalistic observation has its limitations as well. First, some behaviors (e.g., heroic efforts to help in emergencies) occur too infrequently and unexpectedly to be studied through naturalistic observation. Second, it is difficult to pinpoint the causes of the behavior observed because in a natural setting many potential causes are operating at once. Finally, the presence of an observer can sometimes make people behave differently than they otherwise would. Children may "ham it up" for an audience; parents may be on their best behavior.

To achieve greater control over the conditions under which they gather behavioral data, and to capture rarely occurring events, researchers often use **structured observation**. That is, they create special stimuli, tasks, or situations designed to elicit the behavior of interest. The most famous example in developmental psychology is the Strange Situation, a carefully orchestrated infant stress test in which infants are brought to a laboratory play room and briefly separated from and reunited with their mother or father to assess the quality of their attachment to their parent (see Chapter 13). By exposing all research participants to the same stimuli, structured observation increases the investigator's ability to compare the effects of these stimuli on different individuals. Concerns about this method center on whether research participants will behave naturally and whether conclusions based on their behavior in specially designed settings will generalize to their behavior in the real world.

Physiological Measurements

Finally, developmental scientists increasingly take physiological measurements to assess variables of interest to them. For example, they use electrodes to measure electrical activity in the brain, chart changes in hormone levels in menopausal women, or measure heart rate and other indicators of arousal to assess emotions.

Today, exciting breakthroughs are being made in understanding relationships between brain and behavior and development through the use of **functional magnetic resonance imaging (fMRI)**, a neuroimaging technique that uses magnetic forces to measure the increase in blood flow to an area of the brain that occurs when that brain area is active. By having children and adults perform tasks while lying very still in an fMRI scanner, researchers can determine which parts of the brain are involved in particular cognitive activities. Sometimes fMRI studies reveal that children and adults—or young adults and older adults—rely on different areas of the brain to perform the same tasks. Research involving fMRI and other neuroimaging methods, although still evolving, is beginning to provide exciting new insights into typical and atypical brain development and aging and their associations with cognition and behavior (see, e.g., Gutchess, 2019; Matthews & Fair, 2015; Telzer et al., 2018; see Chapter 4).

Physiological measurements have the advantage of being hard to fake; the person who tells you she is not angry may be physiologically aroused, and the adolescent who claims not to take drugs may be given away by a blood test. Physiological measurements can be particularly useful in studying infants because infants cannot tell us verbally what they are thinking or feeling. The main limitation of physiological measurements is that it is not always clear exactly what they are assessing. For example, physiological arousal can signal other emotions besides anger.

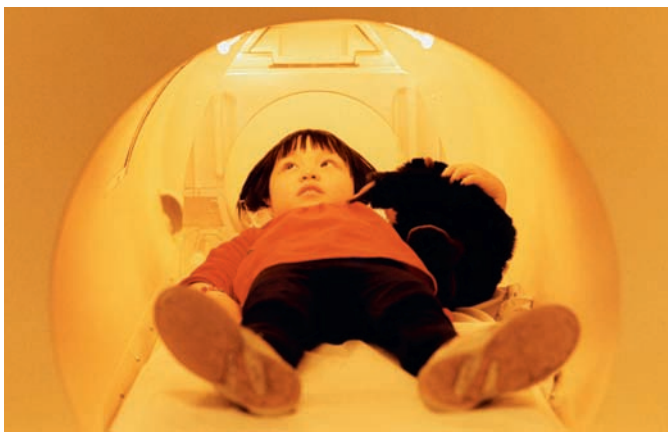
These, then, are the most commonly used techniques of collecting data about human development: verbal report measures (interviews, questionnaires, tests, and scales), behavioral observation (both naturalistic and structured), and physiological measures (see **Table 1.5** for a summary and examples). Because each method has its limitations, knowledge is advanced the most when *multiple* methods and measures are used to study the same aspect of human development and these different methods yield similar conclusions.

● **Table 1.5** Verbal Report, Behavioral Observation, and Physiological Measurements

Type of Measure	Examples
Verbal Report	
Interview	Taped oral interviews with older adults about their adjustment to retirement
Questionnaire or survey	Written questions to young adults about their sexual activities
Test	Individual or group test of IQ, academic achievement, creativity
Scale	Personality scale, vocational interest scale, or depression scale with items to which the person can agree or disagree
Behavioral Observation	
Naturalistic observation	Observation of usual parent–child interaction in the home
Structured observation	Observation of children's aggressive responses in a contrived situation in which they are provoked by another child
Physiological Measurements	
Hormone measurement	Analysis of cortisol, the stress hormone, obtained from a saliva sample after a stressful experience such as giving a speech in front of an audience
Brain imaging (e.g., functional MRI)	Blood flow measurement in relevant brain areas as adolescents think through moral dilemmas
Arousal measures	Measures of physiological arousal such as heart rate, skin conductance, and muscle tension in response to photos or videos showing violent acts

The Case Study, Experimental, and Correlational Methods

Once developmental scientists have formulated hypotheses, chosen a sample, and figured out what to measure and how to measure it, they can test their hypotheses. As we have seen, developmental science got its start with baby biographies, and on occasion today's researchers still study the development of particular individuals through case studies. More often they use the experimental and correlational methods to examine relationships between one variable and another—and, where possible, to establish that one causes another. We illustrate these methods in action by sampling research on the implications of digital media for human development.



Functional magnetic resonance imaging (fMRI) is increasingly used to study which parts of the brain are activated when humans of different ages perform various cognitive tasks. Testing children is challenging, however; they may fear entering the tube of the MRI scanner and, once there, may have difficulty staying still as required. Stephan Elleringmann/laif/Redux

The Case Study

A **case study** is an in-depth examination of an individual (or a small number of individuals), typically carried out by compiling and analyzing information from a variety of sources, such as observing, testing, and interviewing the person or people who know him or her (see Flyvbjerg, 2011; S. A. Miller, 2017). The case study method can provide rich information about the complexities of an individual's development and the influences on it. It is particularly useful in studying people with rare conditions, disorders, and developmental experiences when it is not possible to assemble a large sample of people to study or when an unusual case, such as a child shut in a closet for much of her early life, can say something important about development.

To illustrate, the case study method was used by Matthew Bowen and Marvin Firestone (2011) to describe in some detail four individuals, all European American males, who have what has come to be called *Internet addiction disorder*. One of the four men that they studied spent all afternoon and night until 8:00 or 9:00 A.M. online, mostly in chat rooms and on blogs or playing video games. He enjoyed disguising his identity and making other participants in chat rooms think that he knew all about their most painful experiences. All four men in the case study were found to have psychological problems and difficulties in interpersonal relationships.

The case study method can complement correlational and experimental research (Flyvbjerg, 2011). It can be a good source of hypotheses that can be examined further in larger-scale studies, and it can provide a rich picture of atypical development.

However, conclusions based on a single case (or four) may not generalize to other individuals, and conclusions about what may have caused a person to develop as he or she did often need further study.

The Experimental Method

In an **experiment**, an investigator manipulates or alters some aspect of the environment to see how this affects the behavior of the individuals studied. Consider the effects of watching videos or DVDs on infants. Many of today's parents, eager to get their babies off to a fast start, buy them special baby videos that claim they will advance infants' cognitive and language development—products such as Baby Einstein's Baby Wordsworth, Intellectual Baby (which promises to teach babies to read), and others. Do such infant videos actually speed infant language development?

Judy DeLoache and her colleagues (2010) decided to find out by conducting an experiment with 72 infants ranging in age from 12 to 18 months. The DVD they studied showed scenes of a house and yard while a voice labeled 25 different household objects, each shown three different times. Each family in the study was randomly assigned to one of four experimental groups:

1. *Parent teaching*. In this old-fashioned condition, no video was provided; rather, parents were given the 25 words featured in the video and asked to teach as many as possible to their babies however they wished.
2. *Video-with-interaction*. Child and parent watched the video together five or more times a week for 4 weeks and interacted as they did.
3. *Video-with-no-interaction*. Infants watched the video by themselves; their parents were usually nearby but did not interact with them.
4. *No-intervention*. These babies got no video and no parent training; this control group was needed to determine how many words infants might learn naturally, without any training.

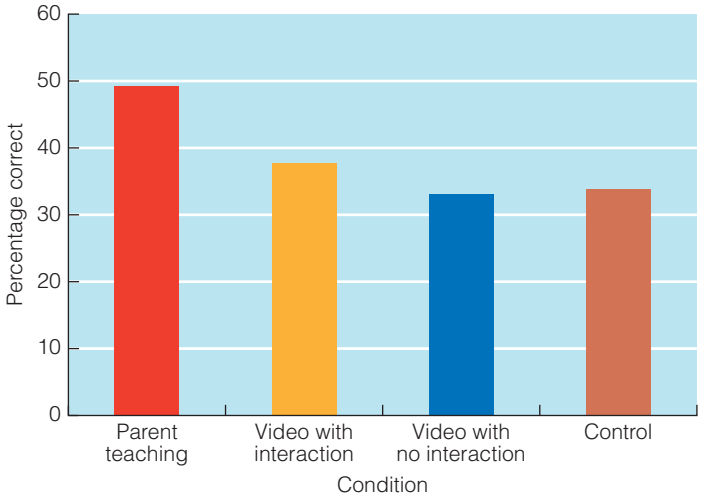
After the training period, babies took a test of their knowledge of the target words. For example, an infant would be presented with replicas of a *table* (a target word in the video) and a *fan* (not a target word) and asked to point to the right object: "Can you show me the table?"

The goal of an experiment is to see whether the different treatments that together form the **independent variable**—the variable manipulated so that its causal effects can be assessed—have different effects on the behavior expected to be affected, the **dependent variable** in the experiment. The independent variable in DeLoache's experiment was the type of training babies received, as defined by the four different experimental conditions. The dependent variable of interest was vocabulary learning (the percentage of words taught in the video that were correctly identified by the infant during the vocabulary test). When cause–effect relationships are studied in an experiment, the independent variable is the hypothesized cause and the dependent variable is the effect. Another example: If researchers were testing drugs to improve memory function in older adults with mild dementia, the type of drug administered (e.g., a new drug vs. a placebo pill with no active ingredients) would be the independent variable and performance on a memory test would be the dependent variable.

So, in DeLoache's experiment, did vocabulary learning "depend on" the independent variable, the type of training received? The mean or average word learning scores for the four treatment groups are shown in ■ **Figure 1.3**. Babies did no better on the vocabulary test if they had seen the video than if they were in the control condition and received no training at all. The only group that did better on the test than what would be expected by chance was the group of babies taught the old-fashioned way—those in the parent teaching group. And it wasn't that babies or mothers were unenthusiastic about the video. As one mother exclaimed, "She loves the blasted thing. It's crack for babies!" (DeLoache et al., 2010, p. 1572).

The DeLoache study has the three critical features essential in any true experiment. These are the features needed if researchers are to achieve the scientific goal of explanation and determine whether a cause–effect relationship exists:

1. **Random assignment to conditions.** **Random assignment** of participants to different experimental conditions (e.g., by drawing names blindly to determine who gets which treatment) is critical; it helps ensure that the treatment groups are similar in all respects at the outset (e.g., in the baby video study, similar in socioeconomic status, ethnicity, previous level of cognitive and language development, and any other characteristics that could affect infants' performance). Only if experimental groups are similar initially can researchers be confident that any differences among groups at the end of the experiment were caused by differences in which experimental treatment they received. (*Note:* Random *assignment* is about making comparison groups in an experiment as similar as possible whereas random *sampling* is done to select a



■ **Figure 1.3** Infants' mean scores on the vocabulary test after training in the DeLoache et al. (2010) experiment. Only infants taught words by their parents did better than chance on the test; exposure to baby videos that taught the words had no effect.

Source: Adapted from DeLoache et al. (2010), Figure 1, p. 1572.

sample to study so that findings will generalize to the larger population from which the sample was selected.)

2. **Manipulation of the independent variable.** Investigators must arrange for different experimental groups to have different experiences. If investigators merely compare infants who already watch baby videos with infants who do not, they cannot establish whether video watching *causes* an increase in word knowledge. For example, it could be that highly educated parents buy these videos more often than less-educated parents and also talk and read more to their children.
3. **Experimental control.** In a true experiment with proper **experimental control**, all factors other than the independent variable are controlled or held constant so that they cannot contribute to differences among the treatment groups. In a laboratory study, for example, all experimental groups may be tested in the same room by the same experimenter reading the same instructions. It is hard in a field experiment like DeLoache's, where the experimental conditions are implemented in children's homes by their parents, to control all extraneous factors. However, DeLoache and her colleagues asked parents to keep a log of their use of the video (or of the time they spent teaching vocabulary words if they were in the parent teaching condition). This allowed the experimenters to check that parents were sticking to the instructions for their treatment group. They were trying their best to ensure that infants in the four treatment conditions were treated similarly in all ways—except for the type of training they received.

So, an experiment involves random assignment of participants to treatment conditions, manipulation of an independent variable, and control of extraneous factors in order to assess effects of the independent variable on one or more dependent variables. The greatest strength of the experimental method is its ability to establish unambiguously that manipulating the independent variable *causes* a change in the dependent variable. When experiments are properly conducted, they contribute to our ability to *explain* human development and sometimes to *optimize* it.

Does the experimental method have limitations? Absolutely! First, because experiments are often conducted in laboratory settings or under unusual conditions, *the results may not always be generalizable to the real world*. Bronfenbrenner (1979)—yes, the developer of bioecological systems theory—was critical of the fact that so many developmental studies are contrived experiments. He once charged that developmental psychology had become "the science of the strange behavior of children in strange situations with strange adults" (p. 19).

Second, *the experimental method often cannot be used for ethical reasons*. How would you conduct a true experiment to determine how older women are affected by their husbands' deaths, for example? You would need to identify a sample of older women, randomly assign them to either the experimental group or the control group, and then manipulate the independent variable by killing the husbands of all the members of the experimental group! Ethical principles obviously demand that developmental scientists use methods other than true experimental ones to study questions about the effects of widowhood—and a host of other important questions about development.

The Correlational Method

Largely because it is unethical to manipulate people's lives, most developmental research is correlational rather than experimental. The **correlational method** involves determining whether two or more variables are related in a systematic way. Rather than manipulating an independent variable, researchers take people as they are and attempt to determine whether there are relationships between their experiences or characteristics and their developmental outcomes.

Like DeLoache and her colleagues, Frederick Zimmerman and his colleagues (2007) were interested in the effects of media viewing on the language development of infants. They conducted a correlational study that involved telephone surveys with 1008 parents of children 8–24 months of age. They asked about infants' exposure to several types of media—not only videos and DVDs especially for babies, but children's educational programs, children's noneducational programs, and "grownup" TV. They used an established measure of language development in which parents report on their children's understanding of various words, and they correlated frequency of exposure to the different types of media with infants' vocabulary scores.

In correlational studies, researchers often determine the strength of the relationship between two variables of interest by calculating a **correlation coefficient**—an index of the extent to which individuals' scores on one variable are systematically associated with their scores on another variable. A correlation coefficient (symbolized as r) can range in value from -1.00 to $+1.00$. A positive correlation between video viewing time and language development would indicate that as time spent watching videos increases, so does an infant's language development score. (■ **Figure 1.4A**). A positive correlation of $r = +.80$ would indicate a stronger, more predictable positive relationship than a smaller positive correlation such as $r = +.20$. A negative correlation would result if the heaviest video viewers consistently had the lowest language development scores and the lightest viewers had the highest language development scores (■ **Figure 1.4B**). A correlation near 0.00 would be obtained if there was no relationship between the two variables—if one cannot predict how advanced in language development infants are based on knowing how much they watch baby videos (■ **Figure 1.4C**).

What did Zimmerman's study find? Among the youngest infants (8–16 months), each hour of viewing baby DVDs or videos per day was associated with *fewer* words known; the correlation was small but negative. By contrast, parent reading and storytelling were positively correlated with language development scores. Among older infants (ages 17–24 months), baby video viewing was not associated one way or the other with language development scores, as the DeLoache et al. (2010) experimental study also found. However, reading, and to a lesser extent storytelling, continued to be positively correlated with language development.

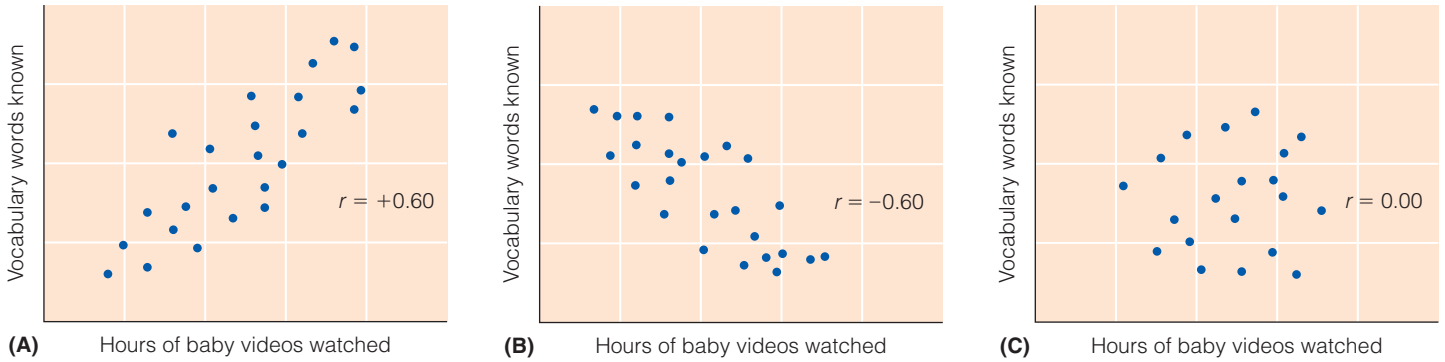


Figure 1.4 Plots of hypothetical correlations between the time babies spend watching infant videos and their knowledge of vocabulary words. Each dot represents a specific child who spends a certain amount of time watching baby videos and has a certain score on a vocabulary test. Panel A shows a positive correlation between video watching and vocabulary: The more infants watch infant videos, the more vocabulary words they know. Panel B shows a negative correlation: The more infants watch videos, the fewer vocabulary words they know. Finally, Panel C shows zero correlation: The amount of time watching baby videos is unrelated to an infant's knowledge of vocabulary words.

Should we conclude from the Zimmerman study, then, that giving babies under 17 months of age baby videos and DVDs impedes their language development? Not so fast. Because this is a correlational study, we cannot draw firm cause–effect conclusions the way we can in an experiment. Does watching baby videos really delay language development among young infants, or could there be other reasons for this negative relationship between watching baby videos and vocabulary?

One important rival interpretation in most correlational studies is the **directionality problem**: The direction of a cause–effect relationship could be the reverse of what the researcher thinks it is. That is, exposure to baby videos may not *cause* infants to be delayed in language development; rather, as Zimmerman et al. (2007) acknowledge, slow language development could cause video viewing. That is, parents who fear that their infants are delayed in language development may load up on baby videos in the hope that the videos will speed language development. To make matters more complex, both of the two causal directions could be at work at once.

A second rival interpretation in correlational studies is the **third variable problem**: The association between the two variables of interest may be caused by some uncontrolled third variable (sometimes called a confounding variable). Zimmerman and his colleagues measured and tried to control for a number of possible third variables. For example, what if parents who are not very motivated to interact with their babies rely more on videos to babysit their babies than more engaged parents and that it is limited parent–infant interaction, not increased time watching baby videos, that hurts their infants' language development? To rule out this possibility, Zimmerman and his colleagues showed that babies' video watching was negatively correlated with their vocabulary scores even when the amount of parent interaction through reading and storytelling, as well as a number of other potential "third variables," such as parent education and income, were controlled through statistical techniques to make it "as if" the families of high and low baby video watchers were similar. As the researchers admitted, though, they did not control for the quality of parent–infant interactions or for additional, unmeasured third variables that could possibly explain why some infants both watch more baby videos than other infants and have lower language development scores.

Is this infant really building her vocabulary as she watches baby videos? Both experimental and correlational studies suggest that infants learn more from face-to-face interactions than from baby videos. Peopleimages/E+/Getty Images

Thus, the correlational method has one major limitation: It cannot unambiguously establish a causal relationship between one variable and another the way an experiment can. Correlational studies can predict development but they can only *suggest* that a cause–effect relationship exists. Although Zimmerman's team tried using statistical control techniques to get some confounding factors out of the picture, they could not completely rule out the directionality problem and the third variable problem to establish a cause–effect relationship between baby video viewing and delayed language development.

● **Table 1.6** A Comparison of the Experimental Method and the Correlational Method

Experimental Method	Correlational Method
Manipulation by the investigator of an independent variable to observe effect on a dependent variable	Study of the relationship between one variable and another (without investigator manipulation and control of people's experiences)
Random assignment to treatment groups (to ensure similarity of groups except for the experimental manipulation)	No random assignment (so comparison groups may not be similar in all respects)
Experimental control of extraneous variables	Lack of control over extraneous variables
Can establish a cause–effect relationship between independent variable and dependent variable	Can suggest but not firmly establish that one variable causes another, owing to directionality and third variable problems
May not generalize to the "real world" if the experiment is contrived or artificial	Can study multiple influences operating in natural settings, so findings may generalize better to the "real world"
May not be possible for ethical reasons	Can be used to study important issues that cannot be studied experimentally for ethical reasons

This is why your professors are always chanting, "Correlation is not causation."

Despite the directionality problem and the third variable problem limiting causal conclusions, the correlational method is extremely valuable. First, as already noted, most important questions about human development can be addressed only through the correlational method because it would be unethical to manipulate people's experiences in experiments. Second, complex correlational studies and statistical analyses allow researchers to learn about how multiple factors operating in the "real world" may combine to influence development. We just have to be on the lookout for the directionality problem and the third variable problem in interpreting correlational findings. If you are wondering, most studies so far suggest that baby DVDs neither help nor hurt infants' language development (Ferguson & Donnellan, 2014). Video chatting has more potential as a learning tool because the person on the screen is not just a "talking head" but a live social partner who reacts to the infant or toddler's behavior the way face-to-face companions do (Kirkorian, 2018; Roseberry et al., 2014). See ● **Table 1.6** for a comparison of experimental and correlational methods.

In the end, understanding of why humans develop as they do is best advanced when the results of different kinds of studies *converge*—when experiments demonstrate a clear cause–effect relationship and correlational studies reveal that the same relationship seems to operate in everyday life. One study's findings are not enough to go on. When we have the results of multiple studies addressing the same question, they can be synthesized to produce more solid conclusions through the research method of **meta-analysis** (Glass et al., 1981; van IJzendoorn et al., 2012). We illustrate the use of meta-analysis in **Exploration 1.1**, which looks at the implications of social media use for the mental health of adolescents and emerging adults.

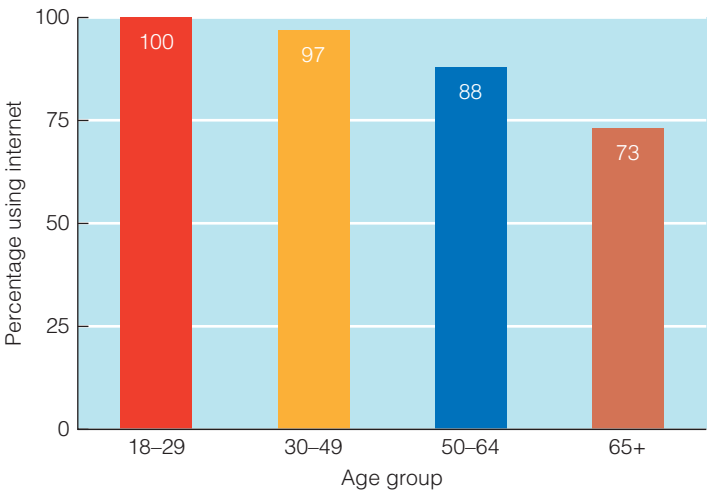
Developmental Research Designs

Along with the experimental and correlational methods they use to study relationships between variables, developmental researchers need specialized research designs to study how people change as they get older (Schaie, 2000). To describe development, researchers have relied most on two types of research designs: the cross-sectional design and the longitudinal design. A third design, the sequential study, combines these two designs in an attempt to overcome their limitations.

Cross-Sectional Designs

In a **cross-sectional design**, measures assessing people of different age groups, or cohorts, are compared. A **cohort** is a group of individuals born at the same time, either in the same year or within a specified span of years (e.g., baby boomers, born in the years after World War II, are a cohort). A researcher interested in the development of vocabulary might gather samples of speech from a number of 2-, 3-, and 4-year-olds; calculate the mean (or average) number of distinct words used per child for each age group; and compare these means to describe how the vocabulary sizes of children age 2, 3, and 4 differ. The cross-sectional study provides information about *age differences*. By seeing how age groups differ, researchers can attempt to draw conclusions about how performance changes with age.

Suppose we are interested in learning about how adults' use of the Internet changes as they get older. ■ **Figure 1.5** shows the



■ **Figure 1.5** Percentage of American adults of different ages who used the Internet in 2019. Do you think that Internet use normally declines with age during adulthood? Read about age effects versus cohort effects in cross-sectional studies.

Source: Pew Research Center (2019).

percentage of each age group of U.S. adults who reported using the Internet in 2019. Internet use is obviously more common among young adults than among older adults. But can we conclude that Internet use normally declines with age as people get older? If not, why not?

People who are age 65 and over not only are older but they also belong to a different cohort or generation and have had different formative experiences than younger adults. Personal computers did not even exist when today's older adults were children or adolescents, whereas younger generations have grown up with them and are therefore more comfortable with them. Do older adults use the Internet less because people lose interest in the Internet as they age, or is it that 70-year-olds were never as heavily into computers even when they were younger and therefore use the Internet less than younger generations? We cannot tell.

In cross-sectional studies like this, *age effects and cohort effects are confounded, or entangled*. **Age effects** are relationships between age and an aspect of development. **Cohort effects** are the effects of being born as a member of a particular cohort or generation in a particular historical context. Cross-sectional studies tell us how people of different ages (cohorts) differ, but they do not necessarily tell how people normally *change* as they get older. What looks in Figure 1.5 like a developmental trend toward declining computer use in later life (an age effect) could actually be a cohort effect resulting from differences in the earlier experiences of the different generations studied. Indeed, the Pew Research Center (2019) has found through yearly surveys of this sort conducted from 2000 to 2019 that Internet use among U.S. adults—including among adults aged 65 and older—has been steadily *increasing* year by year. As **Figure 1.6** shows, the percentage of older adults who reported using the Internet climbed from only 14% in 2000 to 73% by 2019. Yes, a lower percentage of older adults than younger adults used the Internet in 2019 (or any other year in the graph), but more and more older adults each year go online. This is a completely different picture than we got from the cross-sectional study shown in Figure 1.5, where Internet use seemed to *decrease* in later adulthood. (And that's precisely why we chose this example!)

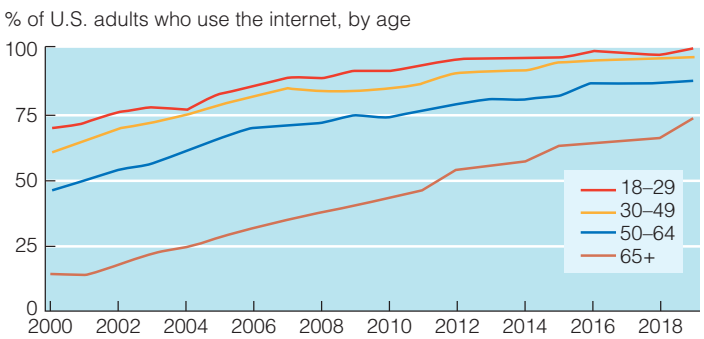


Figure 1.6 Percentage of U. S. adults who use the Internet by age group each year, based on surveys conducted since 2000.

Source: Pew Research Center (2019).

Cohort effects pose a problem in cross-sectional research whenever the growing-up experiences of the cohorts being compared differ. As you will see in Chapter 7, it was once believed, based on cross-sectional studies of performance on intelligence tests, that most people experience significant declines in intellectual functioning starting in middle age. However, later longitudinal studies, which retested the same individuals as they aged, suggested that intellectual declines were much less steep and came later in life (Schaie, 2000). Why the discrepancy? The older adults in cross-sectional studies probably performed less well than younger cohorts not so much because they experienced major declines in intellectual abilities during middle adulthood (a true developmental or age effect) but because they had received less education in their youth (a cohort effect). They probably always had lower intellectual abilities than younger, better-educated cohorts as a result.

The discovery of cohort effects is important: It is further evidence that development is influenced by its historical and cultural context. Understanding how people typically change with age and understanding how they are affected by the historical-cultural context in which they develop are both important goals of the science of life-span development.

The second major limitation of the cross-sectional design besides the entanglement of age effects and cohort effects is this: Because each person is observed at only one point, *researchers learn nothing about how individuals change with age*. Returning to our Internet-use example, researchers cannot look at whether different people show similar or different patterns of change in Internet use as they get older or whether people's levels of Internet use at age 30 predict whether they are heavy or light users at age 70. To address issues like these, researchers need to do longitudinal research.

Despite the limitations of the cross-sectional design, it is a very important approach and developmentalists rely heavily on it. It has the great advantage of being quick and easy: Researchers can go out this year, sample individuals of different ages, and be done with it. Moreover, cross-sectional studies should yield valid conclusions about age effects if the cohorts studied are likely to have had similar growing-up experiences—as when 3- and 4-year-olds rather than 30- and 40-year-olds are compared. It is when researchers study development over the span of many years that cohort effects in cross-sectional studies can yield a misleading picture of development.

Longitudinal Designs

In a **longitudinal design**, one cohort of individuals is assessed repeatedly over time. A study of the development of vocabulary would be longitudinal rather than cross-sectional if a researcher identified a sample of 2-year-olds and measured their vocabulary sizes, then measured their vocabularies again at age 3 and then again at age 4, and compared the children's mean scores at ages 2, 3, and 4. In any longitudinal study, whether it covers only a few months in infancy or 50 years, the same individuals are studied as they develop. Thus, the longitudinal design provides information about *age changes* rather than age differences.

EXPLORATION 1.1

What is All That Social Media Time Doing to Your Mental Health?

Adolescents and emerging adults today spend many hours a week with digital media—everything from TV and streaming videos to Instagram, texting, Twitter, and Facetime. The Pew Research Center (2018) finds that 95% of American teens have access to a smartphone and 45% of them are online "almost constantly." Surveys of adolescents from 1976 to 2016 revealed big increases in screen time over that period, with 12th graders spending about 6 hours a day using digital media by 2016 (Twenge, Joiner, et al., 2018). Trends were similar for teens of different genders, races and ethnic groups, and socioeconomic statuses.

Researchers have become especially interested in the question of whether high levels of social media use—time with social networking sites such as Facebook, Instagram, and Snapchat—are associated with increased mental health problems among adolescents, possibly by reducing developmentally important activities such as face-to-face interaction or aggravating their sense of loneliness. Jean Twenge and her colleagues have done analyses linking decreases in indicators of adolescent well-being and mental health in recent years to increases in screen time and social media use. They have found that those teens who spend much time with their smartphones and other devices and little time engaged in face-to-face interactions, schoolwork, and other developmentally important activities tend to be the least happy and satisfied with their lives (Twenge, Martin, et al., 2018). Moreover, these researchers have found that more use of social networking sites is correlated with more depression symptoms, especially among girls, and even with more suicidal behavior (Twenge, Joiner, et al., 2018).

Is too much screen time bad for development? One 13-year-old, who had spent most of the summer in her bedroom with her smartphone, said this about her generation: "We didn't have a choice to know any life without iPads or iPhones. I think we like our phones more than we like actual people" (Twenge, 2017, p. 59).
Alex Potemkin/iStock/Getty Images

In a meta-analysis of mostly correlational studies like Twenge's of relationships between social media use and mental health, 23 samples involving a total of 13,929 participants were used to draw conclusions (Marino et al., 2018). A correlation of +.34, calculated by averaging correlations from the 23 samples, indicated that heavy use of social media was associated with more signs of psychological distress such as depression and anxiety symptoms. Other large analyses find this same

Figure 1.7 compares a cross-sectional and a longitudinal design for studying 30-, 50-, and 70-year-olds. Suppose we had had the foresight to design a longitudinal study of Internet use back in 1980 and had surveyed 30-year-olds in 1980, and again in 2000 and again in 2020 (when they would have been 70). The study would have shown that very few adults used the forerunner of the Internet in 1980, but that more and more used the Internet as more and more people gained access to personal computers and then smartphones over the years. A longitudinal study surveying the same sample multiple times would give us a picture like that in Figure 1.6, which was based on surveying a new sample of adults each year—a picture of increased Internet use with age rather than the picture of decreased use obtained from the cross-sectional data in Figure 1.5.

Longitudinal studies have many advantages compared to cross-sectional studies. Because a longitudinal design traces changes in individuals as they get older, it can tell whether most people change in the same direction or whether different individuals travel different developmental paths. It can indicate whether the characteristics and behaviors measured remain consistent over time—for example, whether people who used computers and the Internet a lot at age 30 are still among the heaviest users at age 70. Longitudinal data can even be analyzed to identify subgroups of individuals in a sample who experience distinct developmental trajectories—for example, married adults who remain happy versus married adults who become less happy over the years and may be headed toward divorce (Birditt et al., 2012). Finally, longitudinal research can tell whether experiences earlier in life predict

relationship, but a smaller one (Odgers & Jensen, 2020).

But is this a cause–effect relationship? Consider the directionality problem in correlational research: Does heavy social media use really cause mental health problems, or do mental health problems cause greater social media use? That is, might individuals who are depressed and anxious spend more time on social media sites because they lack meaningful relationships or find interacting face-to-face too stressful? It is not yet clear. However, some research now suggests that the relationship between social media use and mental health may run from experiencing mental health problems to increased social media use, not vice versa (Heffer et al., 2019; Nesi et al., 2017).

What if we study the issue longitudinally to help settle the matter? Sarah Coyne and colleagues (2020) carried out an ambitious 8-year longitudinal study in which adolescents completed surveys every year from age 13 to age 20. If the question was whether teens who are heavy users of social media report more depression and anxiety symptoms than teens who spend less time with social media, the answer was yes, consistent with the meta-analysis by Marino et al. (2018). However, Coyne and her colleagues did a second analysis to see if, for individuals in the sample, increasing social media use beyond the person's usual level of use resulted in a subsequent increase in their depression and anxiety symptoms and whether decreasing their media time resulted in a decrease in their symptoms. Finding such a connection over time would more strongly suggest a causal relationship. In this second analysis, though, there was no relationship between a change in social media use and a subsequent change in symptoms.

How about doing an experimental study, then? Melissa Hunt and colleagues (2018) did a true experiment in which undergraduates were randomly assigned to reduce their Facebook, Instagram, and Snapchat use to 10 minutes a day for 3 weeks while the control group members did what they usually did at these sites. Reducing social media time led to significant reductions in self-reported loneliness and depression over the 3 weeks in the experimental group. In short, the evidence in this new area of study is mixed, but more of it suggests that heavy social media use may be harmful to mental health than suggests it is beneficial.

Some researchers maintain, though, that it is more important to focus on what adolescents do while online than on how much time they spend online. For example, some studies suggest that active uses of social media that involve maintaining current relationships and forging new ones by interacting with peers online can be developmentally beneficial. These kinds of active uses of social media are associated with less loneliness and greater well-being than passive uses such as lurking at classmates' social media sites, making social comparisons between their lives and yours, and perhaps becoming demoralized by FOMO, a "fear of missing out" on all the fun everyone else is having (Clark et al., 2018; Nowland et al., 2018).

We clearly have much more to learn about the effects of social media on youth as our digital environment continues its rapid evolution. The social world of adolescents and emerging adults is very different than it used to be—or than it is today in less "wired" societies, or than it will be in the future. It is becoming clearer that the effects of digital media can be good or bad depending on what adolescents are doing with media, how many hours they are spending with it, and whether it is crowding out other, more developmentally important activities such as doing homework and interacting with friends offline.

traits and behaviors later in life. The cross-sectional design can do none of these.

What, then, are the limitations of the longitudinal design? Our hypothetical longitudinal study of Internet use centered on *one cohort* of individuals: members of the 1950 birth cohort. These people were raised in a time when computers were scarce and lived through a time when they became a fixture in almost every American home. Their Internet use would have increased from 1980 to 2020 as a result, but this does not necessarily mean that Internet use *typically* increases with age or would change the same way with age if we conducted a longitudinal study in a different period of history. The technological advances that occurred from one time of measurement to the next during the time frame of this particular study could be responsible for the observed increase.

Time-of-measurement effects in developmental research are the effects of historical events and trends occurring when the data are being collected. They can affect anyone alive at the time (e.g., effects of an economic recession, a traumatic event like 9/11, a pandemic, advances in health care, or, here, the invention of personal computers and the Internet). In a longitudinal study, then, *age effects and time-of-measurement effects are confounded*. Because of time-of-measurement effects, we may not know whether the age-related changes observed in a longitudinal study are generalizable to people developing in other historical and cultural contexts. Our Internet research example was chosen to highlight problems in both cross-sectional studies (where cohort effects are tangled with age effects) and longitudinal studies (where time-of-measurement effects are tangled with age effects). Moral: It can

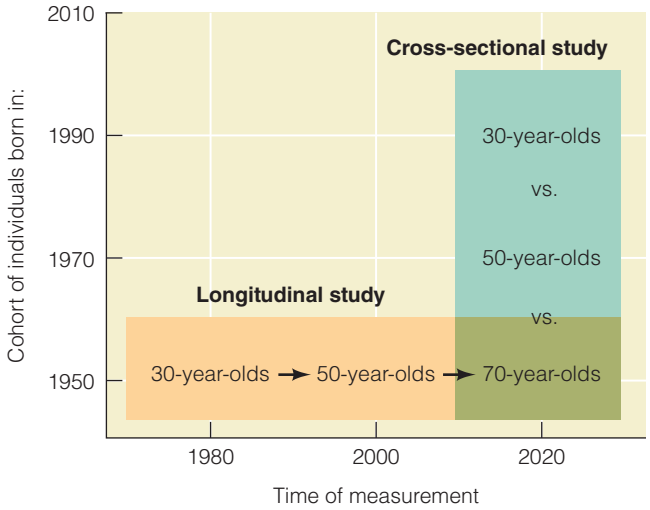


Figure 1.7 Cross-sectional and longitudinal studies of development from age 30 to age 70. The longitudinal study involves repeated assessment every 20 years starting in 1980, whereas in the cross-sectional study, the three age groups of interest are compared in 2020.

be challenging to identify true, generalizable developmental or age effects!

The longitudinal design has other disadvantages besides time-of-measurement effects (Pulkkinen & Kokko, 2012): It is costly and time-consuming; its methods and measures may seem outdated or incomplete by the end of the study; its participants may drop out because they move, lose interest, or die; and participants may be affected by being tested repeatedly (e.g., become more test wise).

Are both the cross-sectional and the longitudinal designs hopelessly flawed, then? Not at all. Cross-sectional studies are very efficient and informative, especially when the cohorts studied are not widely different in age or formative experiences. Longitudinal studies are extremely valuable for what they can reveal about how individuals change as they get older—even though we may not be able to generalize to people living during other times. See ●**Table 1.7** for a summary of the strengths and weaknesses of the cross-sectional and longitudinal designs.

Sequential Designs: The Best of Both Worlds

In an attempt to overcome the limitations of both cross-sectional and longitudinal designs, developmentalists have devised a more powerful method of describing developmental change: the sequential design. A **sequential design** combines the cross-sectional approach and the longitudinal approach in a single study, assessing multiple cohorts of individuals multiple times (Schaie, 1994; Schaie & Caskie, 2005). In Chapter 8, you will read about an ambitious and important sequential study of changes in mental abilities during adulthood conducted by psychologist and gerontologist K. Warner Schaie and his colleagues (1996, 2005). Adults ranging in age from 22 to 70 and grouped into age groups (cohorts) were tested on a battery of mental ability tests (in a cross-sectional design). Then they were retested every 7 years (to create a longitudinal design). At each testing point, new cohorts of adults in their 20s–70s were added to the study and those age groups were then retested. This elaborate study has yielded many insights into intellectual aging.

Sequential designs, by combining the cross-sectional and longitudinal approaches, improve on both. They can tell researchers:

1. which age-related trends are truly developmental in nature and reflect how most people, *regardless of cohort*, can be expected to change over time (age effects);

● **Table 1.7** Cross-Sectional and Longitudinal Developmental Designs

	Cross-Sectional Design	Longitudinal Design
Procedure	Observe people of different cohorts at one point in time	Observe people of one age group repeatedly over time
Information Gained	Describes age differences	Describes age changes
Advantages	Demonstrates age differences in behavior and hints at developmental trends Takes little time to conduct and is inexpensive	Indicates how individuals are alike and different in the way they change over time Can reveal links between early behavior or experiences and later behavior
Disadvantages	Age trends may reflect cohort effects rather than true developmental change	Age trends may reflect time of measurement effects during the study rather than true developmental change
	Provides no information about change in individuals over time	Relatively time-consuming and expensive Measures may later prove inadequate Participants drop out Participants can be affected by repeated testing