TWELFTH EDITION

Adolescence

Laurence Steinberg

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Twelfth Edition

Adolescence

Laurence Steinberg

Temple University

Mc Graw Hill Education

ADOLESCENCE: TWELFTH EDITION

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For Wendy and Ben

About the Author

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LAURENCE STEINBERG, Ph.D., is the Distinguished University Professor and Laura H. Carnell Professor of Psychology at Temple University. He graduated from Vassar College in 1974 and from Cornell University in 1977, where he received his Ph.D. in human development and family studies. He is a Fellow of the American Psychological Association, the Association for Psychological Science, and the American Academy of Arts and Sciences and former President of the Society for Research on Adolescence and the Division of Developmental Psychology of the American Psychological Association. Dr. Steinberg has been on the editorial boards of many major journals, including *Developmental Psychology* and *Child Development,* where he served as Associate Editor. He chaired the National Academies' Committee on the Science of Adolescence and has been a frequent consultant to state and federal agencies and lawmakers on child labor, secondary education, and juvenile justice policy. His work was cited numerous times by the U.S. Supreme Court in its landmark decisions that abolished the juvenile death penalty and mandatory sentences of life without parole for juveniles.

Dr. Steinberg is one of the most highly cited scholars in the field of developmental psychology. His own research has focused on a range of topics in the study of contemporary adolescence, including parent–adolescent relationships, risk taking and decision making, mental health, adolescent brain development, school-year employment, academic achievement, and juvenile crime and justice. He has been the recipient of numerous honors, including the John P. Hill Award for Outstanding Contributions to the Study of Adolescence, given by the Society for Research on Adolescence; the Society for Adolescent Medicine's Gallagher Lectureship; and, from the American Psychological Association, the Urie Bronfenbrenner Award for Lifetime Contribution to Developmental Psychology in the Service of Science and Society, the Award for Distinguished Contributions to Research in Public Policy, and the APA Presidential Citation. In 2009, he was named as the first recipient of the Klaus J. Jacobs Research Prize for Productive Youth Development.

Dr. Steinberg also has been recognized for excellence in research and teaching by the University of California, the University of Wisconsin, and Temple University, where he was honored in 1994 as one of that university's Great Teachers. He has taught undergraduate and graduate courses in adolescence for more than 40 years and has served as the primary advisor to more than 40 graduate students, many of whom have gone on to become influential scholars in their own right in the field of adolescence. In 2013,

he received the Elizabeth Hurlock Beckman Award, a national prize given to college professors who have "inspired their former students to achieve greatness."

In addition to *Adolescence,* Dr. Steinberg is the author or co-author of approximately 400 scholarly articles on growth and development during the teenage years, as well as the books *You and Your Adolescent; When Teenagers Work: The Psychological and Social Costs of Adolescent Employment* (with Ellen Greenberger); *Crossing Paths: How Your Child's Adolescence Triggers Your Own Crisis* (with Wendy Steinberg); *Beyond the Classroom: Why School Reform Has Failed and What Parents Need to Do* (with B. Bradford Brown and Sanford Dornbusch); *The 10 Basic Principles of Good Parenting* (which has been published in 10 languages); *Rethinking Juvenile Justice* (with Elizabeth Scott); and *Age of Opportunity: Lessons From the New Science of Adolescence.* He is co-editor of *Studying Minority Adolescents: Conceptual, Methodological, and Theoretical Issues* (with Vonnie McLoyd) and the *Handbook of Adolescent Psychology* (with Richard Lerner).

Brief Contents

Contents

A Note from the Author

Two psychopathic killers persuaded me to abandon my dreams to someday become a comedy writer and study psychology instead. I did not enter college intending to become either a psychologist or a professor. I majored in English, hoping to study creative writing. I became interested in psychology during the second semester of my freshman year, because of an introductory course in personality theory. My professor had assigned the book *In Cold Blood,* and our task was to analyze the personalities of Dick and Perry, the two murderers. I was hooked. I followed this interest in personality development to graduate school in developmental psychology, where I learned that if you really wanted to understand how we develop into the people we ultimately become, you have got to know something about adolescence. That was 45 years ago, and I'm still as passionate about studying this period of life as I was then.

I hope that this book gets you more excited about adolescence, too.

One reason I like teaching and writing about adolescence is that most students find it inherently interesting, in part because pretty much everyone has such vivid recollections of what it was like to be a teenager. In fact, researchers have discovered that people actually remember events from adolescence more intensely than events from other times, something that has been referred to as the "reminiscence bump."

The reminiscence bump makes teaching adolescence both fun and frustrating. Fun, because it isn't hard to get students interested in the topic. Frustrating, though, because it's a challenge to get students to look at adolescence from a scientific, as well as personal, perspective. That, above all, is my goal for this book. I don't want you to forget or set aside your own experience as an adolescent. (I couldn't make that happen, anyway.) But what I hope I can do is to help you understand adolescence—your own adolescence as well as the adolescence that is experienced by others around the world—more deeply and more intelligently, by introducing you to the latest science on the subject. I still maintain a very active program of research of my own, and that necessitates staying on top of the field's most recent and important developments. There is a lot of exciting work being done on adolescence these days (one of my interests is the adolescent brain), and I want to share this excitement with you. Who knows, maybe you'll become hooked, too.

I've tried to do my best at covering the most important topics and writing about them in a way that is not only informative, but fun and interesting to read. If there's something I could have done better, please let me know.

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Preface

Cutting-edge Science, Personalized for Today's Students

As a well-respected researcher, Laurence Steinberg connects current research with real-world application, helping students see the similarities and differences in adolescent development across different social, economic, and cultural backgrounds.

Through an integrated, personalized digital learning program, students gain the insight they need to study smarter, stay focused, and improve their performance.

Personalized Study, Better Data, Improved Results

McGraw-Hill Education's SmartBook® is an adaptive learning program designed to help students stay focused and maximize their study time. Based on metacognition and powered by McGraw-Hill LearnSmart, SmartBook's adaptive capabilities provide students with a personalized reading and learning experience that helps them identify the concepts they know, and more importantly, the concepts they don't know.

Make It Effective. Unlike other eBooks, SmartBook is adaptive. SmartBook creates a personalized reading experience by highlighting the most impactful concepts a student needs to learn at that moment in time. This ensures that every minute spent with SmartBook is returned to the student as the most value-added minute possible.

Make It Informed. SmartBook continuously adapts, highlighting content based on what the student knows and doesn't know. Real-time reports quickly identify the concepts that require more attention from individual students—or the entire class. Because SmartBook is personalized, it detects the content individual students are most likely to forget and refreshes them, helping improve retention.

New to this edition, SmartBook is now optimized for mobile and tablet and is accessible for students with disabilities. Content-wise, it has been enhanced with improved learning objectives that are measurable and observable to improve student outcomes. SmartBook personalizes learning to individual student needs, continually adapting to pinpoint knowledge gaps and focus learning on topics that need the most attention. Study time is more productive and, as a result, students are better prepared for class and coursework. For instructors, SmartBook tracks student progress and provides insights that can help guide teaching strategies.

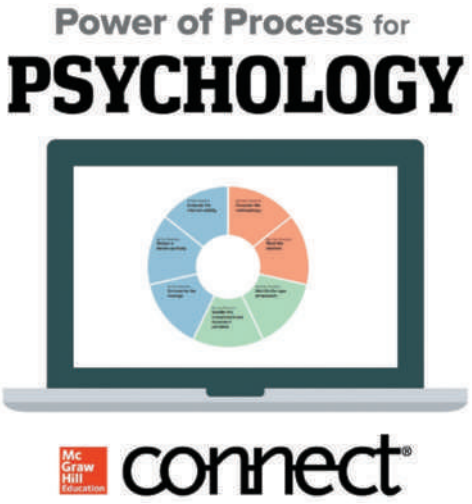
Informed by Students. Content revisions are informed by data collected anonymously through McGraw-Hill Education's SmartBook.

STEP 1. Over the course of three years, data points showing concepts that caused students the most difficulty were anonymously collected from Connect for Adolescence's SmartBook.

STEP 2. The data from SmartBook were provided to the author in the form of a **Heat Map**, which graphically illustrates "hot spots" in the text that affect student learning.

STEP 3. The author used the **Heat Map** data to refine the content and reinforce student comprehension in the new edition. Additional quiz questions and assignable activities were created for use in Connect to further support student success.

RESULT: Because the **Heat Map** gave the author empirically based feedback at the paragraph and even sentence level, he was able to develop the new edition using precise student data that pinpointed concepts that gave students the most difficulty.



Preparing Students for Higher-Level Thinking

At the higher end of Bloom's taxonomy, **Power of Process** helps students improve critical-thinking skills and allows instructors to assess these skills efficiently and effectively in an online environment. Available through Connect, preloaded journal articles are available for instructors to assign. Using a scaffolded framework such as understanding, synthesizing, and analyzing, Power of Process moves students toward higher-level thinking and analysis.

Real People, Real World, Real Life

McGraw-Hill Education's Milestones is a powerful video-based learning tool that allows students to experience life as it unfolds, from infancy through emerging adulthood. A limited number of Milestones videos are now available for viewing within the McGraw-Hill Connect Media Bank for Adolescence, 12e.

Chapter-by-Chapter Changes

The Twelfth Edition of *Adolescence* features updated and expanded coverage of key issues in development in every chapter. And as mentioned earlier, the author revised the text in response to student heat map data that pinpointed the topics and concepts with which students struggle the most. This heat-map-directed revision is reflected primarily in Chapters 2, 4, 8, 11, and 12.

Below is a complete list of changes in each chapter:

Chapter 1

- Thorough update of all content (more than 70 new citations)
- Simplified discussion of hormonal regulation of puberty
- Expanded discussion of body dissatisfaction among adolescent girls
- Expanded discussion of adolescent sleep
- Expanded discussion of eating disorders, adding binge eating disorder
- Dropped discussion of adolescent health care

Chapter 2

- Thorough update of all content (more than 90 new citations)
- Expanded discussion of memory during adolescence and the "reminiscence bump"
- Condensed discussion of intelligence
- Greatly expanded discussion of structural and functional changes in the adolescent brain
- Added discussion of brain development in young adulthood
- Expansion of material on "the social brain"
- Expanded discussion of risk taking in adolescence

Chapter 3

- Thorough update of all content (more than 60 new citations)
- Addition of discussion of late adolescents living at home
- Expanded discussion of terminology used to refer to this age group
- Expanded discussion of impact of poverty on mental health and brain development

Chapter 4

- Thorough update of all content (more than 110 new citations)
- Expanded discussion of acculturation
- Greatly expanded discussion of behavioral genetics
- Added discussion of differential susceptibility theory
- Expanded discussion of homeless adolescents

Chapter 5

- Thorough update of all content (more than 100 new citations)
- Dropped dated discussion of "youth culture"
- Added entirely new section on the need for peer groups in modern society, including Margaret Mead's work on societal change
- Simplified discussion of clique structure
- Dropped dated discussion of racial tension in peer groups
- Greatly expanded discussion of bullying and victimization
- Added new section on cyberbullying

Chapter 6

- Thorough update of all content (more than 50 new citations)
- Added discussion of education policy under President Trump
- Dropped dated examples of minority student school experiences
- Added discussion of school climate and bullying
- Updated discussion of differential treatment of minority adolescents in schools
- Updated material on ADHD and medication for the condition

Chapter 7

- Thorough update of all content (more than 90 new citations)
- Greatly condensed discussion of part-time employment
- Dropped dated material on youth unemployment
- Expanded discussion of risky online behavior, like sexting
- Thoroughly revised discussion of "screen time"
- Added entirely new section on social media

Chapter 8

- Thorough update of all content (more than 80 new citations)
- Added discussion of future orientation
- Updated and expanded material on ethnic identity development and discrimination
- Added discussion of differences among sexual identity, sexual orientation, and gender roles
- Added additional discussion of the development of sexual identity, including mental health of transgender youth

Chapter 9

- Thorough update of all content (more than 50 new citations)
- Condensed discussion of emotional autonomy
- Expanded discussion of self-regulation
- Updated discussion on the reasons for the increase in peer influence in adolescence
- Added material on declines in social responsibility in adolescence

Chapter 10

- Thorough update of all content (more than 70 new citations)
- Added entire section on the impact of social media on the development of Intimacy
- Expanded discussion of dating
- Expanded discussion of dating violence

Chapter 11

- Thorough update of all content (more than 70 new citations)
- Update of all statistics on sexual activity
- Expanded discussion of sexual harassment, especially of LGBTQ youth
- Expanded discussion of the effects of casual sex on mental health
- Expanded discussion of peer influences on sexual activity

Chapter 12

- Thorough update of all content (more than 50 new citations)
- New discussion of interventions to enhance noncognitive contributors to academic success
- Expanded discussion of factors affecting student engagement during transition to secondary school
- Updated statistics on U.S. high school achievement (SAT, NAEP, and PISA)

Chapter 13

- Thorough update of all content (more than 150 new citations)
- Expanded discussion of comorbidity of internalizing and externalizing problems
- Expanded discussion of interplay between genes and environment as contributors to psychosocial problems
- New discussion of e-cigarettes
- Expanded discussion of neurobiological differences between conduct disordered and nondisordered adolescents
- Expanded discussion of drugs and the adolescent brain

- Updated all statistics on prevalence and demographic differences in substance abuse, crime, and depression
- Expanded discussion of neurobiological differences between depressed and nondepressed adolescents
- New discussion of school shootings

Online Instructor Resources

The resources listed here accompany *Adolescence*, 12e. Please contact your McGraw-Hill representative for details concerning the availability of these and other valuable materials that can help you design and enhance your course.

Instructor's Manual Broken down by chapter, the Instructor's Manual includes chapter outlines, suggested lecture topics, classroom activities and demonstrations, suggested student research projects, essay questions, and critical thinking questions.

Test Bank and Computerized Test Bank This comprehensive Test Bank includes multiple choice and essay questions. Organized by chapter, the questions are designed to test factual, applied, and conceptual understanding. All test questions are available within TestGen™ software.

PowerPoint Slides The PowerPoint presentations, now WCAG compliant, highlight the key points of the chapter and include supporting visuals. All of the slides can be modified to meet individual needs.

Acknowledgments

Revising *Adolescence* at a time when so much new information is available is a challenge that requires much assistance. For this new edition, McGraw-Hill Education commissioned a broad survey of the course and I am grateful to the more than 150 instructors who provided feedback on trends in the field and challenges in the classroom.

In addition, I am grateful to the many colleagues and students across the country who took the time during the past 35 years to send me comments and suggestions based on their firsthand experiences using Adolescence in the classroom. They have improved the text with each edition.

The Study of Adolescent Development

INTRODUCTION

In the spring of 2015, the world watched closely as a young man named Dzhokhar Tsarnaev went on trial for the Boston Marathon bombing. The question before the jury was not whether Tsarnaev had committed this horrific crime—he had admitted as much—but whether he should receive a sentence of life in prison or the death penalty.

Tsarnaev was 19 when the bombing took place. Among the witnesses called by Tsarnaev's defense team was Jay Giedd, a prominent expert in adolescent brain development. Giedd testified that recent studies showed that the brain was still maturing during the late teens and early 20s. Building on Giedd's testimony, Tsarnaev's attorneys argued that people this age lacked the ability to stand up to a more powerful peer, like an older brother, and that this immaturity made Tsarnaev less than fully responsible for his behavior and, accordingly, less deserving of capital punishment.

Defense attorneys for Dzhokhar Tsarnaev, the admitted Boston Marathon bomber, used adolescent brain science to argue that he should be spared the death penalty. The jury disagreed.
©FBI/Getty Images News/Getty Images

The jury rejected this argument. On May 15, 2015, Dzhokhar Tsarnaev was sentenced to death.

Although advances in adolescent brain science did not sway the jury in the Boston Marathon bombing case, the science of adolescent development is changing the way in which we think about this stage of life (Steinberg, 2014). Historically, and pretty much around the world, we have drawn a legal boundary between adolescence and adulthood at age 18 (even though in the United States there are some things people are permitted to do at an earlier age, like driving, and others that are prohibited until several years later, like purchasing alcohol). But what if the brain is still maturing in the early 20s? What if things like impulse control or the ability to fully think through the future consequences of one's decisions are still developing into the mid-20s? Should this change how we define adulthood under the law?

This question is one that I have been studying and writing about for the past 20 years, and I still don't have a simple answer. If science is our guide, where should we draw the line between adolescence and adulthood? It's not just an abstract, academic exercise. How we answer this question has far-reaching ramifications for society and, of course, for teenagers. At what age should a pregnant adolescent be able to obtain an abortion without her parents' permission? How old should individuals have to be to see a psychologist or have cosmetic surgery without their parents knowing? Have we picked the right ages in deciding who can drive, see R-rated movies, or buy cigarettes? And how should we respond to young offenders? "Do the adult crime, do the adult time" may sound fair from the perspective of crime victims, but does it make sense in light of what we know about adolescent development? When he committed the Boston Marathon bombing, was Dzhokhar Tsarnaev an adolescent or an adult?

making the practical connection

Studies of adolescent brain development have revealed that the brain continues to mature well into the mid-20s. This research was used in several U.S. Supreme Court cases, where the Court ruled that adolescents should not be punished as severely as adults, even when they have been convicted of the same crimes. But some advocates for youth have worried that this same research can be used to limit what teenagers are allowed to do, such as drive or seek an abortion without their parents' knowledge. How would you respond to someone who, on the basis of this research, says that if adolescents are too young to be punished like adults, they are too young to be treated like adults in other ways as well?

The Boundaries of Adolescence

The word *adolescence* is derived from the Latin *adolescere,* which means "to grow into adulthood" (R. Lerner & Steinberg, 2009). In all societies, adolescence is a time of growing up, of moving from the immaturity of childhood

into the maturity of adulthood, of preparation for the future (Larson, Wilson, & Rickman, 2009; Schlegel, 2009). **Adolescence** is a period of transitions: biological, psychological, social, economic. During adolescence, individuals become interested in sex and biologically capable of having children. They become wiser, more sophisticated, and better able to make their own decisions. They become more self-aware, more independent, and more concerned about what the future holds. Over time, they are permitted to work, get married, drive, and vote. Think for a moment about how much you changed between when you finished elementary school and when you graduated from high school. I'm sure you'll agree that the changes you went through were remarkable.

As you can see in Table I.1, there are a variety of boundaries we might draw between childhood and adolescence, and between adolescence and adulthood. A biologist would place a great deal of emphasis on the attainment and completion of puberty, but an attorney would look instead at important age breaks designated by law, and an educator might draw attention to differences between students enrolled in different grades in school. Is a biologically mature fifth-grader an adolescent or a child? Is a 20-year-old college student who lives at home an adolescent or an adult? There are no right or wrong answers to these questions. It all depends on the boundaries we use to define the period. Determining the beginning and ending of adolescence is more a matter of opinion than of absolute fact.

Rather than argue about which boundaries are the correct ones, it makes more sense to think of development during adolescence as involving a *series* of transitions from immaturity into maturity (Howard & Galambos, 2011; Settersten, Furstenberg, & Rumbaut, 2005; Trejos-Castillo & Vazsonyi, 2011). Some of these passages are long and some are short; some are smooth and others are rough. And not all of them occur at the same time. Consequently, it is quite possible—even likely—that an individual will mature in some respects before she matures in others. The various aspects of adolescence have different beginnings and different endings for every individual. An individual can be a child in some ways, an adolescent in other ways, and an adult in still others.

adolescence
The stage of development that begins with puberty and ends when individuals make the transition into adult roles, roughly speaking, from about 10 until the early 20s.

For the purposes of this book, we'll define adolescence as beginning with puberty and ending when individuals make the transition into adult roles, roughly from age 10 until the early 20s. Although at one time "adolescence" may have been synonymous with the teenage years (from 13 to 19), the adolescent period has lengthened considerably in the past 100 years, both because physical maturation occurs earlier and because so many individuals delay entering into work and marriage until their mid-20s (Steinberg, 2014).

Early, Middle, and Late Adolescence

Because so much psychological and social growth takes place during adolescence, most social scientists and practitioners view adolescence as composed of a series of phases rather than one single stage (Samela-Aro, 2011). The 11-year-old whose time and energy is wrapped up in hip-hop, Instagram, and basketball, for example, has little

Table I.1 The boundaries of adolescence. Here are some examples of the ways in which adolescence has been distinguished from childhood and adulthood that we examine in this book. Which boundaries make the most sense to you?

Perspective	When Adolescence Begins	When Adolescence Ends
Biological	Onset of puberty	Becoming capable of sexual reproduction
Emotional	Beginning of detachment from parents	Attainment of separate sense identity
Cognitive	Emergence of more advanced reasoning abilities	Consolidation of advanced reasoning abilities
Interpersonal	Beginning of shift in interest from parental to peer relations	Development of capacity for intimacy with peers
Social	Beginning of training for adult work, family, and citizen roles	Full attainment of adult status and privileges
Educational	Entrance into junior high school	Completion of formal schooling
Legal	Attainment of juvenile status	Attainment of majority status
Chronological	Attainment of designated age of adolescence (e.g., 10 years)	Attainment of designated age of adulthood (e.g., 21 years)
Cultural	Entrance into period of training for ceremonial rite of passage	Completion of ceremonial rite of passage

early adolescence
The period spanning roughly ages 10–13, corresponding roughly to the junior high or middle school years.

middle adolescence
The period spanning roughly ages 14–17, corresponding to the high school years.

late adolescence
The period spanning roughly ages 18–21, corresponding approximately to the college years.

emerging adulthood
The period spanning roughly ages 18–25, during which individuals make the transition from adolescence to adulthood.

in common with the 21-year-old who is involved in a serious romance, worried about pressures at work, and looking for an affordable apartment.

Social scientists who study adolescence differentiate among **early adolescence** (about ages 10–13), **middle adolescence** (about ages 14–17), and **late adolescence** (about ages 18–21). In discussing development during adolescence, we'll need to be sensitive not only to differences between adolescence and childhood, or between adolescence and adulthood, but also to differences among the various phases of adolescence itself. Some writers also have suggested that a new phase of life, called **emerging adulthood** (Arnett, 2004), characterizes the early and mid-20s. However, despite the popularity of this idea in the mass media, there is little evidence that "emerging adulthood" is a universal stage or that the majority of young people in their mid-20s are in some sort of psychological or social limbo (Côté & Bynner, 2008; Kloep & Hendry, 2014). Indeed, what is most striking about the transition from adolescence to adulthood today is just how many different pathways there are. Some individuals spend their 20s single, dependent on their parents, and bouncing from job to job, while others leave adolescence and go straight into marriage, full-time employment, and economic independence (Osgood, Ruth, Eccles, Jacobs, & Barber, 2005).

One recent study of rural American youth, in which high school juniors were asked about their expectations for the future, found three distinct groups: "early starters," "employment focused," and "education focused." "Early starters" expected to finish their schooling, enter the labor force, and live on their own immediately after high school; they thought they would start a family before they were 22. The "employment-focused" group expected to finish school, start regular employment, and live on their own before turning 21, but did not expect to start a family until several years later. The "education-focused" group did not expect to finish their schooling until they were 22, and did not expect to start a family until age 24 or 25 (Beal, Crockett, & Peugh, 2016) (see Figure I.1). Clearly, there are multiple pathways from adolescence into adulthood.

A Framework for Studying Adolescent Development

This book uses a framework for studying adolescence that is based on a model originally suggested by John Hill (1983). The model has three basic components: (1) the fundamental changes of adolescence, (2) the contexts of adolescence, and (3) the psychosocial developments of adolescence.

The Fundamental Changes of Adolescence

What, if anything, is distinctive about adolescence as a period in development? This is the first component of Hill's framework of study, the *fundamental changes of adolescence*, which encompasses biological, cognitive, and social dimensions. According to Hill, three features of adolescent development give the period its special flavor and significance: (1) the onset of puberty (biological), (2) the emergence of more advanced thinking abilities (cognitive), and (3) the transition into new roles in society (social). Importantly, these three sets of changes are universal changes; virtually without exception, all adolescents in every society go through them.

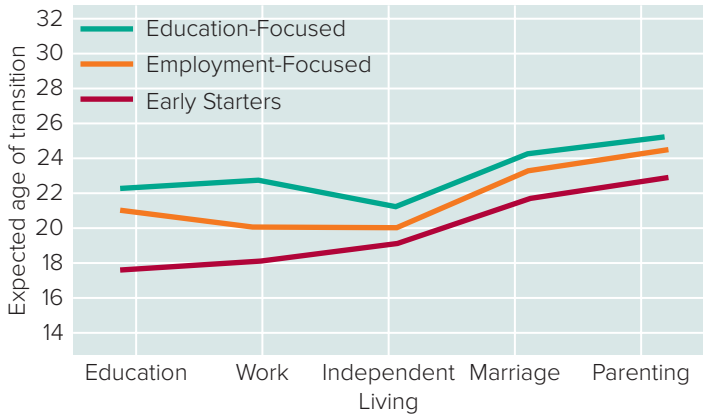


Figure I.1 **In one study of expectations for the future among rural high school juniors, three groups were found: "early starters," "employment focused," and "education focused."** (Beal, Crockett, & Peugh, 2016)

Biological Transitions The chief elements of the biological changes of adolescence—which collectively are referred to as **puberty**—involve changes in the young person's physical appearance (including breast development in girls, the growth of facial hair in boys, and a dramatic increase in height for both sexes) and the development of the ability to conceive children (Bogin, 2011).

We'll look at the biological changes that occur in early adolescence and examine how puberty affects the adolescent's psychological development and social relationships.

Cognitive Transitions The word *cognitive* refers to the processes that underlie how people think. Changes in thinking abilities make up the second of the three fundamental changes of adolescence. Compared with children, adolescents are much better able to think about hypothetical situations (that is, things that have not yet happened but might, or things that may not happen but could) and about abstract concepts, such as friendship, democracy, or morality (Keating, 2011). As you'll read, groundbreaking research on brain development is beginning to shed light on the ways in which these and other changes in thinking during adolescence result from the maturation of various brain regions and systems (Engle, 2013; Spear & Silveri, 2016).

The implications of the cognitive changes of adolescence are far-reaching. ©McGraw-Hill Education

making the cultural connection

In contemporary industrialized society, we do not have formal ceremonies that designate when a person has become an "adult." Do we have more informal ways to let individuals know when they have made the transition? What were the most important events in your life that signaled your entrance into adulthood?

Social Transitions All societies distinguish between individuals who are viewed as children and those who are seen as ready to become adults. Our society, for example, distinguishes between people who are "underage," or minors, and people who have reached the age of majority. Not until adolescence are individuals permitted to drive, marry, and vote. Such changes in rights, privileges, and responsibilities constitute the third set of fundamental changes that occur at adolescence: social changes. In some cultures, the social changes of adolescence are marked by a formal ceremony—a **rite of passage**. In most contemporary industrialized societies, the transition is less clearly marked, but a change in social status is a universal feature of adolescence (Markstrom, 2011).

The Contexts of Adolescence

Although all adolescents experience the biological, cognitive, and social transitions of the period, the *effects* of these changes are not uniform for all young people. Puberty makes some adolescents feel attractive and self-assured, but it makes others feel ugly and self-conscious. Being able to think in hypothetical terms makes some teenagers thankful that they grew up with the parents they have, but it prompts others to run away from home. Reaching 18 prompts some teenagers to enlist in the military or apply for a marriage license, but for others, becoming an adult is something they'd like to delay as long as possible.

If the fundamental changes of adolescence are universal, why are their effects so varied? Why isn't everyone affected in the same ways by puberty, by advanced thinking abilities, and by changes in legal status? The answer is that the psychological impact of the biological, cognitive, and social changes of adolescence is shaped by the environment in which the changes take place. In other words, psychological development during adolescence is a product of the interplay between a set of three very basic, universal changes and the context in which these changes are experienced.

Consider, for example, two 14-year-old girls growing up in neighboring communities. When Mariana went through puberty, around age 13, her parents' first reaction was to restrict her social life. They were afraid she would become too involved with boys and neglect her schoolwork. Mariana thought her parents were being ridiculous. She rarely had a chance to meet anyone she wanted to date, because all the older boys

puberty
The biological changes of adolescence.

rite of passage
A ceremony or ritual marking an individual's transition from one social status to another, especially marking the young person's transition to adulthood.

ecological perspective on human development
A perspective on development that emphasizes the broader context in which development occurs.

went to the high school across town. Even though she was in the eighth grade, she was still going to school with fifth-graders. Mariana reacted by pulling away from parents she felt were overprotective.

Kayla's adolescence was very different. When she had her first period, her parents did not panic about her developing sexuality. Instead, they took her aside and discussed sex and pregnancy with her. They explained how different contraceptives worked and made an appointment for Kayla to see a gynecologist in case she ever needed to discuss something with a doctor. This made perfect sense. Although she was still only 14, Kayla would probably begin dating soon, because in her community, the junior and senior high schools had been combined into one large school, and the older boys frequently showed interest in the younger girls. Puberty brought Kayla closer to her parents, not more distant.

Two teenage girls. Each goes through puberty, each grows intellectually, and each moves closer in age to adulthood. Yet each grows up under very different circumstances: in different families, in different schools, with different groups of peers, and in different communities. Both are adolescents, but their adolescent experiences are markedly different. And, as a result, each girl's psychological development will follow a different course.

Imagine how different your adolescence would have been if you had grown up a century ago and, instead of going to high school, had been expected to work full-time from the age of 15. Imagine how different it might be to grow up 100 years from today. And imagine how different adolescence is for a teenager from a very poor family than for one whose family is wealthy. It is impossible to generalize about the nature of adolescence without taking into account the surroundings and circumstances in which young people grow up.

For this reason, the second component of our framework is the *context* of adolescence. According to the **ecological perspective on human development**, whose main proponent was Urie Bronfenbrenner (1979), we cannot understand development without examining the environment in which it occurs. In modern societies, there are four main contexts in which young people spend time: families, peer groups, schools, and work and leisure settings.

Of course, these settings themselves are located within neighborhoods, which influence how they are structured and what takes place in them. It would be naive, for example, to discuss the impact that "school" has on adolescent development without recognizing that a school in an affluent suburb is likely very different from one in the inner city or in a remote rural area. And the community in which these settings are located is itself embedded in a broader context that is shaped by culture, geography, and history (Bronfenbrenner, 1979).

Although young people growing up in modern America share some experiences with young people all over the world, their development is different in many ways from that of young people in other societies, especially those in less affluent and less industrialized ones, because their families, peer groups, schools, work and leisure settings, and neighborhoods are different (Larson, Wilson, & Rickman, 2009). In other words, the contexts of adolescence are themselves shaped and defined by the larger society in which young people live. In this book, we'll be especially interested in the contexts of adolescence in contemporary industrialized society and the ways in which they affect young people's development. Key contexts include the following:

Families Adolescence is a time of dramatic change in family relationships (Cox, Wang, & Gustafsson, 2011; Martin, Bascoe, & Davies, 2011). In addition, many changes in what constitutes a "family" have taken place over the past several decades, leading to tremendous diversity in family forms and household composition in modern society. It's important to understand how changes within the family, and in the broader context of family life, affect young people's psychological development.

Peer Groups Over the past 100 years, the peer group has come to play an increasingly important role in the socialization and development of teenagers (Dijkstra & Veenstra, 2011). But has the rise of peer groups in contemporary society been a positive or negative influence on young people's development? This is one of the many questions that has interested researchers who study the nature and function of adolescent peer groups and their effects on teenagers' psychological development.

One of the most important contexts for adolescent development is the peer group. ©SW Productions/Getty Images

Schools Contemporary society depends on schools to occupy, socialize, and educate adolescents. But how good a job are schools doing? What should schools do to help prepare adolescents for adulthood? And how should schools for adolescents be structured (Cortina & Arel, 2011)?

Work, Leisure, and the Mass Media Some of the most important influences on adolescent development are found outside of home and school: part-time jobs (Neyt, Omey, Verhaest, & Baert, 2017), extracurricular activities (Farb & Matjasko, 2012), and the mass media (Brown & Bobkowski, 2011), including social media, which have become increasingly important in teenagers' lives (Shapiro and Margolin, 2014; Twenge, 2017). To what extent do these forces influence adolescents' attitudes, beliefs, and behavior?

Psychosocial Development in Adolescence

The third, and final, component of our framework concerns the major *psychosocial developments* of adolescence—identity, autonomy, intimacy, sexuality, and achievement—as well as certain psychosocial problems that may arise at this age. Social scientists use the word **psychosocial** to describe aspects of development that are both psychological and social in nature. Sexuality, for instance, is a psychosocial issue because it involves both psychological change (that is, changes in the individual's emotions, motivations, and behavior) and changes in the individual's relationships.

Of course, it is not only during the adolescent years that concerns about identity, autonomy, intimacy, sexuality, and achievement arise, and psychological or social problems can and do occur during all periods of life. They represent basic developmental challenges that we face as we grow and change: (1) discovering and understanding who we are as individuals—**identity;** (2) establishing a healthy sense of independence—**autonomy;** (3) forming close and caring relationships with others—**intimacy;** (4) expressing sexual feelings and enjoying physical contact with others—**sexuality;** and (5) being successful and competent members of society—**achievement.**

Although these concerns are not unique to adolescence, development in each of these areas takes a special turn during this stage. Understanding how and why such psychosocial developments take place during adolescence is a major interest of scientists who study this age period. We know that individuals form close relationships before adolescence, for example, but why is it that romantic relationships first develop during adolescence? We know that toddlers struggle with learning how to be independent, but why during adolescence do individuals need to be more on their own and make some decisions apart from their parents? We know that children fantasize about what they will be when they grow up, but why don't these fantasies become serious concerns until adolescence?

Identity In adolescence, a variety of important changes in the realm of identity occur (Harter, 2011; Thomaes, Poorthuis, & Nelemans, 2011). The adolescent may wonder, "Who am I, and what kind of life will I have?" Coming to terms with these questions may involve a period of experimentation—a time of trying on different personalities in an attempt to discover one's true self. The adolescent's quest for identity is not only a quest for a personal sense of self but also for recognition from others that he or she is a special, unique individual. Some of the most important changes of adolescence take place in the realms of identity, self-esteem, and self-conceptions.

psychosocial
Referring to aspects of development that are both psychological and social in nature, such as developing a sense of identity or sexuality.

identity
The domain of psychosocial development involving self-conceptions, self-esteem, and the sense of who one is.

autonomy
The psychosocial domain concerning the development and expression of independence.

intimacy
The psychosocial domain concerning the formation, maintenance, and termination of close relationships.

sexuality
The psychosocial domain concerning the development and expression of sexual feelings.

achievement
The psychosocial domain concerning behaviors and feelings in evaluative situations.

Autonomy Adolescents' struggle to establish themselves as independent, self-governing individuals—in their own eyes and in the eyes of others—is a long and occasionally difficult process, not only for young people but also for those around them, especially their parents (Zimmer-Gembeck, Ducat, & Collins, 2011). Three aspects of autonomy are of special importance during adolescence: becoming less emotionally dependent on parents (McElhaney, Allen, Stephenson, & Hare, 2009), learning to function independently (Steinberg, 2014), and establishing a personal code of values and morals (Morris, Eisenberg, & Houltberg, 2011).

Intimacy During adolescence, important changes take place in the individual's capacity to be intimate with others, especially with peers. During adolescence, friendships emerge that involve openness, honesty, loyalty, and exchange of confidences, rather than simply a sharing of activities and interests (B. Brown & Larson, 2009). Dating takes on increased importance, and as a consequence, so does the capacity to form romantic relationships that are trusting and loving (Shulman, Connolly, & McIssac, 2011).

Sexuality Sexual activity usually begins during adolescence (Diamond & Savin-Williams, 2011). Becoming sexual is an important aspect of development at this age—not only because it transforms the nature of relationships

Sexuality is a central psychosocial issue of adolescence.
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between adolescents and their peers, but also because it raises many difficult questions for the young person. These concerns include incorporating sexuality into a still-developing sense of self, understanding one's sexual orientation, resolving questions about sexual values and morals, and coming to terms with the sorts of relationships into which the adolescent is prepared—or not prepared—to enter.

Achievement Adolescence is a time of important changes in individuals' educational and vocational behavior and plans. Crucial decisions—many with long-term consequences—about schooling and careers are made during adolescence. Many of these decisions depend on adolescents' achievement in school, on their evaluations of their own competencies and capabilities, on their aspirations and expectations for the future, and on the direction and advice they receive from parents, teachers, and friends (Wigfield, Ho, & Mason-Singh, 2011).

Psychosocial Problems Although most adolescents move through the period without experiencing major psychological upheaval, this stage of life is the most common time for the first appearance of serious psychological difficulties (Kessler et al., 2005; Olfson, Druss, & Marcus, 2015). Three sets of problems are often associated with adolescence: drug and alcohol use and abuse (Chassin, Hussong, & Beltran, 2009), delinquency and other "externalizing problems" (Farrington, 2009), and depression and other "internalizing problems" (Graber & Sontag, 2009). In each case, we examine the prevalence of the problem, the factors believed to contribute to its development, and approaches to prevention and intervention.

Theoretical Perspectives on Adolescence

The study of adolescence is based not just on empirical research but also on theories of development (Newman & Newman, 2011). You will read more about different theories of adolescence throughout this book, but, for now, let's look briefly at the major ones.

It's useful to organize theoretical perspectives on adolescence around a question that has long dominated discussions of human development more generally: How much is due to "nature," or biology, and how much is due to "nurture," or the environment? Some theories of adolescence emphasize biology, others emphasize the environment, and still others fall somewhere between the two extremes (see Figure I.2). We'll begin with a look at the most extreme biological perspectives and work our way across a continuum toward the other extreme—perspectives that stress the role of the environment.

Biosocial Theories

The fact that biological change during adolescence is noteworthy is not a matter of dispute—how could it be, when puberty is such an obvious part of adolescence? But experts on adolescence disagree about just how

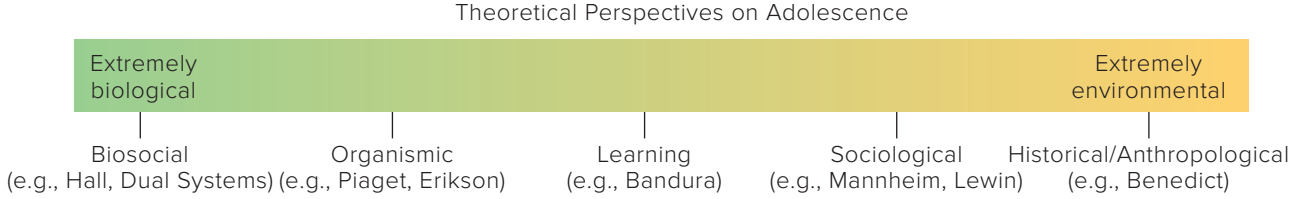

Figure I.2 Theories of adolescence range from the extremely biological, like that of G. Stanley Hall, to the extremely environmental, like that of Ruth Benedict.

important this biological change is in defining the psychosocial issues of the period. Theorists who have taken a biological or, more accurately, "biosocial," view of adolescence stress the hormonal and physical changes of puberty as driving forces. This places **biosocial theories** far at the biological end of the theoretical-perspective continuum. The most important biosocial theorist was G. Stanley Hall (1904), considered the "father" of the scientific study of adolescence.

Hall's Theory of Recapitulation G. Stanley Hall, who was very much influenced by Charles Darwin, the author of the theory of evolution, believed that the development of the individual paralleled the development of the human species, a notion referred to as his theory of recapitulation. Infancy, in his view, was equivalent to the time during our evolution when we were primitive, like animals. Adolescence, in contrast, was seen as a time that paralleled the evolution of our species into civilization. For Hall, the development of the individual through these stages was determined primarily by instinct—by biological and genetic forces within the person—and hardly influenced by the environment.

The most important legacy of Hall's view of adolescence is the notion that it is inevitably a period of "storm and stress." He believed that the hormonal changes of puberty cause upheaval, both for the individual and for those around him or her. Because this turbulence is biologically determined, it is unavoidable. The best that society can do is to find ways of managing the young person whose "raging hormones" invariably cause difficulties.

Although scientists no longer believe that adolescence is inherently problematic, or that pubertal hormones themselves cause emotional problems, much contemporary work continues to emphasize the role that biological factors play in shaping the adolescent experience. More than 100 years ago, in fact, Hall speculated about brain maturation, hormonal influences on behavior, and changes in patterns of sleep during adolescence—all very hot topics in the study of adolescence today (Dahl & Hariri, 2005). Current work in the biosocial tradition, influenced by Hall and his followers as well, also explores the genetic bases of individual differences in adolescence and the evolutionary bases of adolescent behavior (Hollenstein & Lougheed, 2013). Support for the biosocial perspective is also found in many studies of "adolescence" in other species, which have revealed striking similarities between juvenile animals and their human counterparts (Sisk & Romeo, in press; Steinberg, 2016).

Dual Systems Theories Recent advances in brain science have given rise to an alternative biosocial account of adolescent development, one that stresses changes in the anatomy and activity of the brain. Among the most prominent of these theories are so-called "dual systems" or "maturational imbalance" theories, which stress the simultaneous development of two different brain systems—one that governs the ways in which the brain processes rewards, punishments, and social and emotional information, and another that regulates self-control and advanced thinking abilities, like planning or logical reasoning (Shulman et al., 2016). The arousal of this first system takes place early in adolescence, while the second system is still maturing. This creates a maturational imbalance (Casey, Jones, & Somerville, 2011), which has been compared to starting a car without having a good braking system in place. The main challenge of adolescence, according to this view, is to develop better self-regulation, so that this imbalance doesn't result in problems (Steinberg, 2014).

biosocial theories
Theories of adolescence that emphasize the biological changes of the period.

organismic theories
Theories of adolescence that emphasize the interaction between the biological changes of the period and the contexts in which they take place.

Organismic Theories

Our next stop on the continuum is what are called *organismic* theorists. Like biosocial theorists, organismic theorists recognize the importance of the biological changes of adolescence. But unlike their biosocial counterparts, **organismic theories** also take into account the ways in which contextual forces interact with and modify these biological forces. For example, all adolescents experience the biological changes of puberty, but how they are affected by them can be influenced by how their parents and peers respond.

If you have had previous coursework in developmental psychology, you have undoubtedly encountered the major organismic theorists. Three of these theorists, in particular, have had a great influence on the study of adolescence: Sigmund Freud (1938), Erik Erikson (1968), and Jean Piaget (Inhelder & Piaget, 1958). Although these theorists share in common an organismic orientation, the theories they developed emphasize different aspects of individual growth and development.

Freudian Theory For Freud, development was best understood in terms of the psychosexual conflicts that arise at different points in development. Like Hall, Freud saw adolescence as a time of upheaval. According to Freud, puberty temporarily throws the adolescent into a period of psychological crisis, by reviving old conflicts over uncomfortable sexual urges that had been buried in the unconscious (including feelings toward one's parents).

Sigmund Freud himself actually had very little to say specifically about adolescence. But his daughter, Anna Freud (1958), extended much of her father's thinking to the study of development during the second decade of

learning theories
Theories of adolescence that emphasize the ways in which patterns of behavior are acquired through reinforcement and punishment or through observation and imitation.

sociological theories
Theories of adolescence that emphasize the ways in which adolescents, as a group, are treated by society.

life, emphasizing the need for adolescents to break away, or "detach," from their parents in order to develop normally.

Eriksonian Theory Erik Erikson, whose work built on Freud's, also believed that internal, biological developments moved the individual from one developmental stage to the next. But unlike Freud, Erikson stressed the psychosocial, rather than the psychosexual, conflicts faced by the individual at each point in time. Erikson proposed eight stages in psychosocial development, each characterized by a specific "crisis" that arises at that point in development because of the interplay between the internal forces of biology and the demands of society. In Erikson's theory, development in adolescence revolves around the identity crisis. According to Erikson, the challenge of adolescence is to resolve the identity crisis and to emerge with a coherent sense of who one is and where one is headed.

Piagetian Theory For Jean Piaget, development could best be understood by examining changes in the nature of thinking. Piaget believed that, as children mature, they pass through distinct stages of cognitive development.

In Piaget's theory, adolescence marks the transition from concrete to abstract thought. Adolescence is the period in which individuals become capable of thinking in hypothetical terms, a development that permits a broad expansion of logical capabilities. The development of abstract thinking in adolescence is influenced both by the internal biological changes of the developmental period and by changes in the intellectual environment encountered by the individual.

Learning Theories

At the center of the theoretical continuum, between the extreme biological views and extreme environmental ones, we encounter **learning theories.** This group of theories begins to shift the emphasis from biological forces to environmental ones. Whereas organismic theorists emphasize the interaction between biological change and environmental demands, learning theorists stress the context in which behavior takes place. The capacity of the individual to learn from experience is assumed to be a biological given—one that is in place long before adolescence. Learning theorists who study adolescence are interested in the content of what is learned.

Learning theorists have little to say specifically about adolescence as a developmental period, because they assume that the basic processes of human behavior are the same during adolescence as during other periods of the life span. But learning theorists have been extremely influential in the study of adolescent development because they have helped us understand how the specific environment in which an adolescent lives shapes his or her behavior. There are two general categories of learning theorists: *behaviorists* and *social learning theorists*.

Behaviorism Behaviorists emphasize the processes of reinforcement and punishment as the main influences on adolescent behavior. The main proponent of this view was B. F. Skinner (1953), whose theory of operant conditioning has had a tremendous impact on the entire field of psychology. Within this framework, reinforcement is the process through which a behavior is made more likely to occur again, whereas punishment is the process through which a behavior is made less likely to occur again. Adolescents' behavior is nothing more or less than the product of the various reinforcements and punishments they've been exposed to. An adolescent who strives to do well in school, for example, does so because in the past she or he has been reinforced for this behavior or has been punished for not behaving this way. Similarly, a teenager who continues to experiment with risky behavior is being reinforced for this sort of activity or punished for being especially cautious.

Social Learning Theory Social learning theorists, such as Albert Bandura (Bandura & Walters, 1959), also emphasize the ways in which adolescents learn how to behave, but they place more weight on the processes of observational learning and imitation. According to these theorists, adolescents learn how to behave not simply by being reinforced and punished by forces in the environment but also by watching and modeling those around them. Social learning approaches to adolescence have been very influential in explaining how adolescents learn by watching the behavior of others, especially parents, peers, and figures in the mass media, like celebrities. From this vantage point, an adolescent who strives to do well in school or who takes a lot of risks is probably imitating family members, friends, or actors portrayed in the mass media.

Sociological Theories

The emphasis of biosocial, organismic, and learning theories is mainly on forces within an individual, or within that individual's environment, that shape development and behavior. In contrast, **sociological theories** of adolescence attempt to understand how adolescents, *as a group,* come of age in society. Instead of emphasizing differences among individuals in their biological makeups or their experiences in the world, sociological theorists focus on the factors that all adolescents or groups of

adolescents have in common by virtue of their age. Two themes have dominated these discussions: adolescent marginality and intergenerational conflict.

Adolescent Marginality There is a vast difference in power between the adult and the adolescent generations, which may leave young people feeling marginalized, or insignificant. Two important thinkers in this vein are Kurt Lewin (1951) and Edgar Friedenberg (1959). Contemporary applications of this viewpoint stress the fact that because adolescents are often prohibited from occupying meaningful roles in society, young people often become frustrated and restless. Some writers have claimed that many of the problems we associate with adolescence have been created, in part, by the way in which we have structured the adolescent experience, treating adolescents as if they are more immature than they actually are and isolating them from adults (Epstein, 2007).

Intergenerational Conflict The other theme in sociological theories of adolescence concerns conflict between the generations. Theorists such as Karl Mannheim (1952) and James Coleman (1961) stressed the fact that adolescents and adults grow up under different social circumstances and therefore develop different sets of attitudes, values, and beliefs. As a consequence, there is inevitable tension between the adolescent and the adult generations. For example, although adults often criticize Millennials (people born between 1982 and 2004) for being spoiled and lazy, and for taking too long to become adults, many Millennials have responded that they are taking longer to become adults simply because they face many more financial problems in making a successful transition to adulthood than their parents' generation did. As the title of a recent article put it, "Millennials Are Screwed" (Hobbes, 2017).

Historical and Anthropological Perspectives

Historians and anthropologists who study adolescence share with sociologists an interest in the broader context in which young people come of age. Historical perspectives, such as those offered by Glen Elder (1980), Joseph Kett (1977), and Thomas Hine (1999), stress that adolescence as a developmental period has varied considerably from one historical era to another. As a consequence, it is impossible to generalize about such issues as the degree to which adolescence is stressful, the developmental tasks of the period, or the nature of intergenerational relations. Historians would say that these issues all depend on the social, political, and economic forces present at a given time. Even something as basic to our view of adolescence as the "identity crisis," they say, is a social invention that arose because of industrialization and the prolongation of schooling. Prior to the Industrial Revolution, when most adolescents followed in their parents' occupation, people didn't have "crises" over who they were or what they were going to do in life.

One response to adolescents' feelings of marginalization is political protest. ©Joe Raedle/Getty Images

Adolescence as an Invention One group of theorists has taken this viewpoint to its extreme, arguing that adolescence is *entirely* a social invention (Bakan, 1972). They believe that the way in which we divide the life cycle into stages—drawing a boundary between childhood and adolescence, for example—is nothing more than a reflection of the political, economic, and social circumstances in which we live. They point out that, although puberty has always been a feature of human development, it was not until the rise of compulsory education that we began treating adolescents as a special and distinct group. In other words, social conditions, not biological givens, define the nature of adolescent development. We noted earlier that contemporary writers debate whether a new phase of life, "emerging adulthood," actually exists. Writers who believe that different stages of life are social inventions would say that if emerging adulthood has become a stage in development, it only has because society has made it so, not because people have really changed in any fundamental way.

Anthropological Perspectives A similar theme is echoed by anthropologists who study adolescence, the most important of whom were Ruth Benedict (1934) and Margaret Mead (1928/1978). Benedict and Mead pointed out that societies vary considerably in the ways in which they view and structure adolescence. As a consequence, these thinkers viewed adolescence as a culturally defined experience—stressful and difficult in societies that saw it this way, but calm and peaceful in societies that had an

alternative vision. Benedict, in particular, drew a distinction between nonindustrialized societies, where the transition from adolescence to adulthood is generally gradual and peaceful, and modern industrialized societies, where transition to adulthood is abrupt and difficult.

making the scientific connection

Some writers have argued that the stage of life we call adolescence is a social invention. What do they mean by this? Could you say this about other periods of development? Is infancy a social invention? Is middle age? What about "emerging adulthood"?

Stereotypes Versus Scientific Study

One of the oldest debates in the study of adolescence is whether adolescence is an inherently stressful time for individuals. As we noted earlier, G. Stanley Hall, who is generally acknowledged as the father of the modern study of adolescence, likened adolescence to the turbulent, transitional period in the evolution of the human species from savagery into civilization.

This portrayal of teenagers as passionate, troubled, and unpredictable persists today. One 12-year-old girl I was counseling told me that her mother had been telling her that she would go through a difficult time when she turned 14—as if some magical, internal alarm clock was set to trigger storm and stress on schedule.

The girl's mother wasn't alone in her view of adolescence. Sometime this week pay attention to how teenagers are depicted in popular media. If they are not portrayed as troublemakers—the usual role in which they are cast—adolescents are sex-crazed idiots (if they are male), giggling fools or "mean girls" (if they are female), or tormented lost souls, searching for their place in a strange, cruel world (if they aren't delinquent, sex-crazed, giggling, or gossiping). It's not only fictionalized portrayals of teenagers that are stereotyped. Scholars, too, have been influenced by this viewpoint—a disproportionate number of scientific studies of adolescents have focused on young people's problems rather than their normative development (Steinberg, 2014).

Stereotypes of adolescents as troubling and troubled have important implications for how teenagers are treated—by teachers, by salespersons, and by parents. One study, for example, measured mothers' general beliefs about adolescence to see how well these preconceptions predicted how their teenager behaved (Buchanan & Hughes, 2009). The more likely a mother was to believe that teenagers are reckless and rebellious, the more likely it was that her teenager actually behaved this way one year later, perhaps because the mother's expectations led her to behave in a way that brought out the worst in her adolescent. Parent–teenager relations are influenced by the expectations they have about each other. For example, one study found that when mothers believed that their teenagers were likely to use alcohol this actually led to increases in their child's drinking (Madon, Willard, Guyll, Trudeau, & Spoth, 2006). Similarly, snooping on teenagers leads them to become more secretive, which is likely to prompt parents to snoop even more (Hawk et al., 2013).

Fortunately, the tremendous growth of the scientific literature on adolescence over the past three decades has led to more accurate views of normal adolescence among practitioners who work with young people, although a trip to the "Parenting" section of your local bookstore will quickly reveal that the storm-and-stress stereotype is still alive and well, where most books are "survival guides" (Steinberg, 2014). (I once saw a book titled *Surviving Your Dog's Adolescence*!) Today, most experts do not dismiss the storm-and-stress viewpoint as entirely incorrect but see the difficulties that some adolescents have as due largely to the context within which they grow up.

You probably have many preconceptions of your own about adolescence. These beliefs are based in part on your own experiences as a teenager and in part on the images of adolescents that you have been exposed to over the years—in books, on film, and on television. As several writers have pointed out, scholars' descriptions of teenagers are influenced by the time during which they are writing. To the extent that we *want* to see adolescents as different from adults, writers exaggerate the differences between teenagers and their elders and portray young people as "out of control due to hormonal storms" (Lesko, 1996, p. 157). During periods of economic downturn, for instance, when jobs are scarce, adolescents are depicted as immature, unstable, and incompetent, whereas during periods of war, they are portrayed as mature, responsible, and capable (Enright, Levy, Harris, & Lapsley, 1987). Presumably, these characterizations serve a hidden agenda—during depressions, there are fewer jobs to go around, and adults may need to see adolescents as incapable of working, whereas the reverse is true during wartime, when adolescents are needed to take on jobs and serve in the military.

making the personal connection

If someone were to make generalizations about the nature of adolescence by analyzing *your* experiences as a teenager, how would the period be portrayed?

Adolescence, like any other developmental stage, has both positive and negative elements (Siegel & Scovill, 2000). Young people's willingness to challenge authority, for instance, is both refreshing (when we agree with them) and annoying (when we do not). Their propensity to take risks is both admirable and frightening. Their energy and exuberance is both exciting and unsettling.

One of the goals of this book is to provide you with a more realistic understanding of adolescent development in contemporary society—an understanding that reflects the best and most up-to-date scientific research. As you read the material, think about your personal experiences as an adolescent, but try to look beyond them and be willing to question the "truths" about teenagers that you have grown accustomed to over the years. This does not mean that your experiences were not valid, or your recollections inaccurate. (In fact, studies show that we remember things that happen during adolescence more vividly than any other time [Steinberg, 2014].) But remember that your experiences as a teenager were the product of a unique set of forces that have made you who you are today. The person who sits next to you in class—or the person who right now, in some distant region of the world, is thinking back to his or her adolescence—was probably exposed to different forces than you were and probably had a different set of adolescent experiences as a consequence.

1 Biological Transitions

According to an old joke, there are only two things in life that one can be sure of—death and taxes. To this brief list, we might add puberty—the physical changes of adolescence. Not all adolescents experience identity crises, rebel against their parents, or fall madly in love, but virtually all go through puberty, the biological changes that change our appearance and ultimately make us capable of sexual reproduction.

Puberty, however, is greatly affected by the context in which it occurs. Physical development is influenced by a host of environmental factors, and the timing and rate of pubertal growth vary across regions of the world, socioeconomic classes, ethnic groups, and historical eras. Today, in contemporary America, the average girl has her first period at about age 12. At the turn of the 20th century, she was around 14½.

Physical and sexual maturation profoundly affect the ways in which adolescents view themselves and are viewed and treated by others. But the social environment exerts a tremendous impact on the psychological and social consequences of going through puberty (Skoog & Stattin, 2014). In some traditional societies, pubertal maturation brings with it a series of public initiation rites that mark the passage of the young person into adulthood, socially as well as physically. In other societies, recognition of the physical transformation from child into adult takes more subtle forms. Parents may merely remark, "Our little boy has become a man," when they discover that he needs to shave, or "Our little girl has grown up," when they learn that she has gotten her first period. Early or late maturation may be cause for celebration or cause for concern, depending on what is admired or made fun of in a given peer group at a given point in time. The fifth-grader who is developing breasts might be embarrassed, but the ninth-grader who has not developed breasts might be equally self-conscious.

In sum, even the most universal aspect of adolescence—puberty—is hardly universal in its impact on the young person. In this chapter, we examine just how and why the environment in which adolescents develop exerts its influence even on something as fundamental as puberty. As you will learn, the adolescent's social environment even affects the age at which puberty begins.

Puberty: An Overview

Puberty derives from the Latin word *pubertas,* which means "adult." Technically, the term refers to the period during which an individual becomes capable of sexual reproduction. More broadly, however, puberty encompasses all the physical changes that occur in adolescents as they pass from childhood into adulthood (Dorn & Biro, 2011).

Puberty has three chief physical manifestations:

1. A rapid acceleration in growth, resulting in dramatic increases in height and weight.
2. The development of primary sex characteristics, including the further development of the gonads (sex glands), which results in a series of hormonal changes.
3. The development of secondary sex characteristics, including changes in the genitals and breasts, and the growth of pubic, facial, and body hair.

Each of these sets of changes is the result of developments in the endocrine and central nervous systems, many of which begin years before the signs of puberty are evident—some actually occur at conception (Susman & Dorn, 2009). No new hormones are produced at puberty. Rather, the levels of some hormones that have been present since before birth increase, whereas others decline.

The Endocrine System

The **endocrine system** produces, circulates, and regulates levels of hormones. **Hormones** are highly specialized substances that are secreted by one or more endocrine glands and then enter the bloodstream and travel throughout the body. **Glands** are organs that stimulate particular parts of the body to respond in specific ways. Many of the hormones that play important roles at puberty carry their instructions by activating certain brain cells, called **gonadotropin-releasing hormone (GnRH) neurons** (Romeo, in press).

endocrine system
The system of the body that produces, circulates, and regulates hormones.

hormones
Highly specialized substances secreted by one or more endocrine glands.

glands
Organs that stimulate particular parts of the body to respond in specific ways to particular hormones.

gonadotropin-releasing hormone (GnRH) neurons
Specialized neurons that are activated by certain pubertal hormones.

The Hormonal Feedback Loop The endocrine system receives its instructions to increase or decrease circulating levels of particular hormones from the central nervous system, mainly through the firing of GnRH neurons. The system works like a thermostat. Hormonal levels are "set" at a certain point, which may differ depending on the stage of development, just as you might set a thermostat at a certain temperature (and use different settings during different seasons

set point
A physiological level or setting (e.g., of a specific hormone) that the body attempts to maintain through a self-regulating system.

feedback loop
A cycle through which two or more bodily functions respond to and regulate each other, such as that formed by the hypothalamus, the pituitary gland, and the gonads.

pituitary gland
One of the chief glands responsible for regulating levels of hormones in the body.

hypothalamus
A part of the brain that controls the functioning of the pituitary gland.

gonads
The glands that secrete sex hormones: in males, the testes; in females, the ovaries.

testes
The male gonads.

ovaries
The female gonads.

androgens
A class of sex hormones secreted by the gonads, found in both sexes, but in higher levels among males than females following puberty.

estrogens
A class of sex hormones secreted by the gonads, found in both sexes, but in higher levels among females than males following puberty.

HPG (hypothalamic-pituitary-gonadal) axis
The neurophysiological pathway that creates a feedback loop involving the hypothalamus, the pituitary gland, and the gonads.

or different times of the day). By setting your room's thermostat at 60°F, you are instructing your heating system to go into action when the room becomes colder than that. Similarly, when a particular hormonal level in your body dips below the endocrine system's **set point** for that hormone, secretion of the hormone increases; when the level reaches the set point, secretion temporarily stops. And, as is the case with a thermostat, the setting level, or set point, for a particular hormone can be adjusted up or down, depending on environmental or internal bodily conditions.

Such a **feedback loop**—the HPG axis (for hypothalamus, pituitary, gonads)—becomes increasingly important at the onset of puberty. Long before adolescence—in fact, before birth—the HPG axis develops involving three structures: the **pituitary gland** (which controls hormone levels in general), the **hypothalamus** (the part of the brain that controls the pituitary gland, and where there is a concentration of GnRH neurons), and the **gonads** (in males, the **testes**; in females, the **ovaries**), which release the "sex" hormones—**androgens** and **estrogens** (see Figure 1.1).

Although you may think of androgens as "male" hormones and estrogens as "female" hormones, both types of hormones are produced by each sex, and both are present in males and females at birth. During adolescence, however, the average male produces more androgens than estrogens, and the average female produces more estrogens than androgens (Susman & Dorn, 2009).

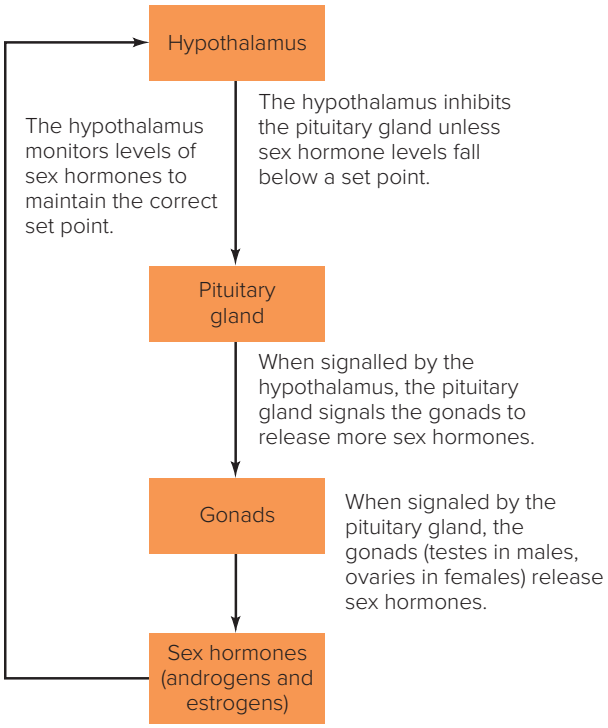

Figure 1.1 Levels of sex hormones are regulated by a feedback system (the HPG axis) composed of the hypothalamus, pituitary gland, and gonads. (Grumbach, Roth, Kaplan, & Kelch, 1974)

Your HPG axis is set to maintain certain levels of androgens and estrogens. It is under the control of the hypothalamus, which inhibits the pituitary gland when hormonal levels get too high. When these hormone levels fall below their set points, the hypothalamus stops inhibiting the pituitary, permitting it to stimulate the release of sex hormones by the gonads. When hormone levels reach the set point, the hypothalamus responds by once again inhibiting the pituitary gland. Just as you might change the setting on your heating thermostat automatically every November 1, or when your utility bill has become too expensive, your brain is constantly monitoring a variety of signals and adjusting your hormonal set points in response. Puberty begins when several different signals—genetic as well as environmental—instruct the brain to change the set point (Sisk & Romeo, 2018).

Adrenarche Just before puberty, the pituitary begins to secrete hormones that act on the thyroid and on the adrenal gland, as well as hormones that stimulate growth more generally (which is why we grow taller and heavier during puberty). As with sex hormones, the release of these substances is also under the control of the hypothalamus. The thyroid and adrenal gland, in turn, secrete hormones that cause various bodily changes to take place.

Do you remember the first time you felt sexually attracted to someone? Maybe it was a tingly feeling that you didn't yet have words for. It turns out that most individuals report that their first sexual attraction took place *before* they went through puberty. These early sexual

feelings may be stimulated by maturation of the adrenal glands, called **adrenarche** (Herdt & McClintock, 2000), which also contributes to the development of body odor, signaling the beginning of sexual maturation to others (Campbell, 2011).

Changes at puberty in the brain system that regulates the adrenal gland are also important because this is the brain system that controls how we respond to stress (Del Giudice, Angeleri, & Manera, 2009). One reason adolescence is a period of great vulnerability for the onset of many serious mental disorders is that the hormonal changes of puberty make us more responsive to stress (Burke, McCormick, Pellis, & Lukkes, 2017; Monahan, Guyer, Silk, Fitzwater, & Steinberg, 2016; Romeo, Patel, Pham, & So, 2016; Sisk & Romeo, in press; Susman, Peckins, Bowes, & Dorn, 2017). This leads to excessive secretion of the stress hormone **cortisol**, a substance that at high and chronic levels can cause brain cells to die (Carrion & Wong, 2012; Gunnar, Wewerka, Frenn, Long, & Griggs, 2009). Exposure to stress in adolescence is also associated with physical health problems and later cardiovascular illness (Crestani, 2017; Lippold, McHale, Davis, Almeida, & King, 2016). Keep in mind, though, that there is a difference between saying that adolescence is an inherently stressful time (which it is not) and saying that adolescence is a time of heightened vulnerability to stress (which it is).

making the personal connection

Do you remember your first feelings of sexual attraction for someone? How old were you?

What Triggers Puberty?

Although the HPG axis is active before birth, it is relatively quiet during childhood. Something happens during middle childhood, though, that reawakens the HPG axis and signals it that the body is ready for puberty. Some of this is due to a clock whose "puberty alarm" is set very early in life by information coded in our genes (the age at which someone goes through puberty is largely inherited). But some of the reawakening of the HPG axis at puberty is due to multiple signals that tell the brain it is time to start preparing for childbearing. These signals indicate whether there are sexually mature mating partners in the environment, whether there are sufficient nutritional resources to support a pregnancy, and whether the individual is physically mature and healthy enough to begin reproducing.

The onset of puberty is stimulated by an increase in a brain chemical called **kisspeptin** (Roseweir & Millar, 2009) (so named because it was discovered in Hershey, Pennsylvania, the birthplace of chocolate kisses). The production of kisspeptin in the brain is affected by other chemicals, most importantly **leptin**, which stimulates it, and **melatonin**, which suppresses it. Leptin is a protein produced by fat cells, and which exists in our body in levels proportionate to our amount of body fat. It plays a critical role in the regulation of hunger and appetite, by suppressing our desire to eat when we're full. In some senses, leptin serves to signal the brain not just that we are full enough, but that we are "fat enough." Melatonin is a hormone that helps regulate the sleep cycle, which we'll discuss later in this chapter.

Early feelings of sexual attraction to others are stimulated by adrenarche, the maturation of the adrenal glands, which takes place before the outward signs of puberty are evident. ©Glow Images

Your genes predispose you to go through puberty around a particular age, but the more fat cells you have, and the more light to which you have been exposed during childhood, the more likely it is that you will go through puberty on the early side of your inherited propensity. Someone with the same genes, but who is thin and doesn't get as much light exposure, will go through puberty later (Lomniczi et al., 2013). This is why puberty starts earlier among overweight children and among children who grow up closer to the equator (Lee et al., 2016). Obese children have more body fat and therefore produce a lot more leptin, which stimulates kisspeptin production. Children who live near the equator are exposed to relatively more sunlight each

adrenarche
The maturation of the adrenal glands that takes place during adolescence.

cortisol
A hormone produced when a person is exposed to stress.

kisspeptin
A brain chemical believed to trigger the onset of puberty.

leptin
A protein produced by the fat cells that may play a role in the onset of puberty through its impact on kisspeptin.

melatonin
A hormone secreted by the brain that contributes to sleepiness and that triggers the onset of puberty through its impact on kisspeptin.

Even though our dog, Benson, was neutered soon after he was born, he still displayed stereotypic "humping" behavior when he reached adolescence, as a result of the impact of prenatal testosterone on his brain. He is pictured here with his favorite romantic partner, Lambie. ©Wendy Steinberg

year, and they have lower melatonin levels as a result, so their kisspeptin production is not suppressed as much as it is among children who live closer to the poles. Exposure to artificial light, especially the kind of light emitted from electronic gadgets, can also suppress melatonin levels and hasten puberty (Greenspan & Deardorff, 2014). Children who spend a lot of time in front of electronic screens may be inadvertently speeding up the onset of puberty.

The reason that body fat and light exposure affect the timing of puberty is found in our evolutionary history. Humans evolved when resources were scarce, and it was adaptive to conceive and bear as many offspring as possible, since not all of them would survive. If the ultimate goal is to bear as many healthy children as possible, once someone has developed enough fat and senses that the season is right for gathering food, it is time to start maturing physically. Our genes don't know that we no longer live in a resource-scarce world and can store food in our cupboards and refrigerators so that we have plenty to eat in the dark of winter. Although conditions have changed, our brains evolve much more slowly, and the timing of puberty is still affected by how much fat we have accumulated and how much light we've been exposed to.

How Hormones Influence Adolescent Development

Most people understandably think that changes in behavior at puberty result from changes in hormones at that time. But this is only partially correct. Long before adolescence—in fact, before birth—hormones organize the brain in ways that may not be manifested in behavior until childhood or even adolescence (Sisk & Romeo, in press). Generally, until about eight weeks after conception, the human brain is "feminine" unless and until it is exposed to certain "masculinizing" hormones, like testosterone. Because levels of testosterone are higher among males than females while the brain is developing, males usually end up with a more "masculinized" brain than females. This sex difference in brain organization predetermines certain patterns of behavior, many of which may not actually appear until much later (Sisk & Romeo, in press). Studies of sex differences in aggression, for example, show that even though some of these differences may not appear until adolescence, they likely result from the impact of prenatal hormones, rather than from hormonal changes at puberty. For instance, my dog, Benson, a male who was neutered shortly after birth, and therefore didn't have testicles when he reached "adolescence" (which in dogs begins sometime between six months and one year, with smaller dogs maturing earlier than larger ones), still displayed stereotypic male "humping" behavior when he reached this age. This was likely due to the way his brain was programmed by sex hormones before he was born.

In other words, the presence or absence of certain hormones early in life "program" the brain and the central nervous system to develop in certain ways and according to a certain timetable (Sisk & Romeo, in press). Because we may not see the resulting changes in behavior until adolescence, it is easy to mistakenly conclude that the behaviors result from hormonal changes that take place at the time of puberty. In reality, however, exposure to certain hormones before birth may set a sort of alarm clock that does not go off until adolescence. Just because the alarm clock rings at the same time that puberty begins does not mean that puberty *caused* the alarm to go off.

Many changes in behavior at adolescence do occur because of changes in hormone levels at puberty, however (Schulz & Sisk, 2016). For instance, the increase in certain hormones at puberty is thought to stimulate the development of secondary sex characteristics, such as the growth of pubic hair. There is also growing evidence that puberty affects the brain in ways that increase adolescents' emotional arousal and desire for highly rewarding, exciting activities, which may make teenagers who are especially sensitive to rewards more prone to emotional and behavioral problems (Forbes & Dahl, 2010; Harden & Mann, 2015; Icenogle et al., 2017; LeMoult, Colich, Sherdell, Hamilton, & Gotlib, 2015; Spielberg et al., 2015).

Still other changes during puberty are likely to be results of an interaction between prenatal and pubertal hormones (Collaer & Hines, 1995). Hormones that are present prenatally may organize a certain set of behaviors (for example, our brains may be set up to have us later engage in sexual behavior), but certain changes in those hormones at puberty may be needed to activate the pattern; that is, individuals may not become motivated to engage in sex until puberty.

Somatic Development

The effects of the hormonal changes of puberty on the adolescent's body are remarkable. The individual enters puberty looking like a child but within four years or so has the physical appearance of a young adult. During this relatively brief period, the average individual grows about 10 inches taller, matures sexually, and develops an adult-proportioned body. Along with many other organs, the brain changes in size, structure, and function at puberty, a series of developments we'll discuss in Chapter 2.

The Adolescent Growth Spurt

The simultaneous release of growth hormones, thyroid hormones, and androgens stimulates rapid acceleration in height and weight. This dramatic increase in stature is called the **adolescent growth spurt**. What is most incredible about the adolescent growth spurt is not so much the absolute gain of height and weight that typically occurs but the speed with which the increases take place. Think for a moment of how quickly very young children grow. At the time of **peak height velocity**—the time at which the adolescent is growing most rapidly—he or she is growing at the same rate as a toddler. For boys, peak height velocity averages about 4 inches (10.3 centimeters) per year; for girls, it's about 3.5 inches (9.0 centimeters). One marker of the conclusion of puberty is the closing of the ends of the long bones in the body, a process called **epiphysis**, which terminates growth in height. Puberty is also a time of significant increase in weight—nearly half of one's adult body weight is gained during adolescence (Susman & Dorn, 2009).

adolescent growth spurt
The dramatic increase in height and weight that occurs during puberty.

peak height velocity
The point at which the adolescent is growing most rapidly.

epiphysis
The closing of the ends of the bones, which terminates growth after the adolescent growth spurt has been completed.

Figure 1.2 shows just how remarkable the growth spurt is with respect to height. The graph on the left shows changes in absolute height and indicates, as you would expect, that the average individual grows throughout infancy, childhood, and adolescence. As you can see, there is little gain in height after age 18. But look now at the right-hand graph, which shows the average increase in height per year (i.e., the *rate* of change) over the same age span. Here you can see the acceleration in height at the time of peak height velocity.

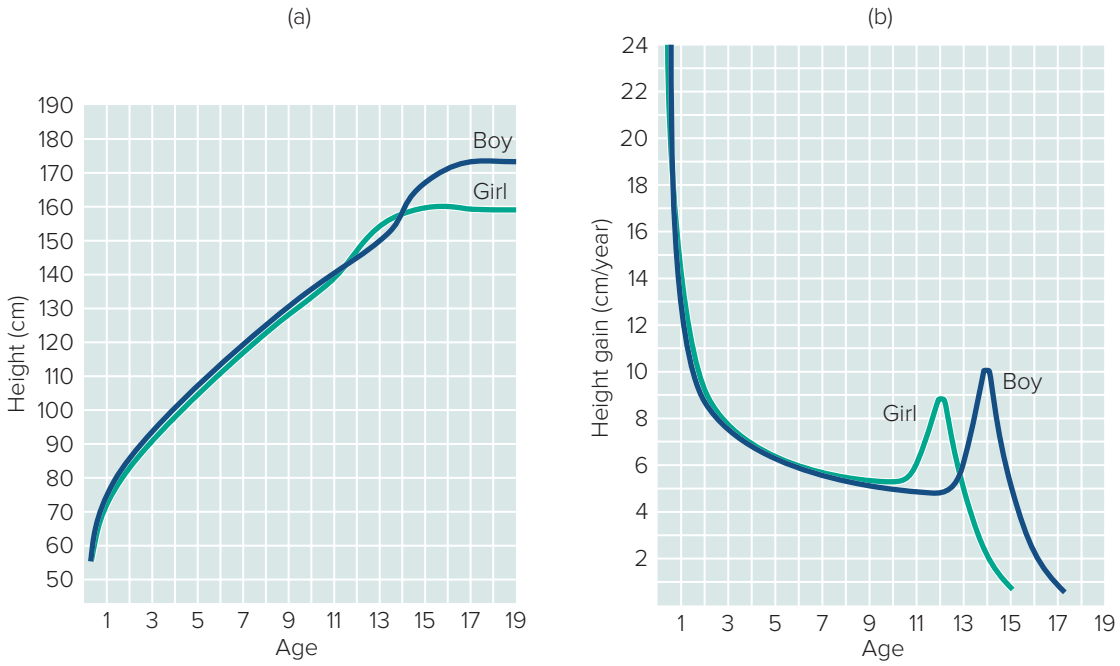

Figure 1.2 (a) Height (in centimeters) at different ages for the average male and female youngster. (b) Gain in height per year (in centimeters) for the average male and female youngster. Note the adolescent growth spurt.
(Adapted from Marshall, 1978)

Figure 1.2 also indicates that the growth spurt occurs, on average, about two years earlier among girls than boys. In general, as you can see by comparing the two graphs, boys tend to be somewhat taller than girls before age 11; then girls tend to be taller than boys between ages 11 and 13; and finally, boys tend to be taller than girls from about age 14 on. Sex differences in height can be a concern for many young adolescents when they begin socializing with members of the opposite sex, especially if they are tall, early-maturing girls or short, late-maturing boys.

The sequence in which various parts of the body grow is fairly regular. Extremities—the head, hands, and feet—are the first to accelerate in growth. Accelerated growth occurs next in the arms and legs, followed by the torso and shoulders.

Because different parts of the body do not all grow at the same rate or at the same time during puberty, young adolescents often appear to be out of proportion physically—as though their nose or legs were growing faster than the rest of them (which may actually be the case). This is why young adolescents often look clumsy or gawky. It is probably little consolation for someone going through the awkward phase of puberty to be told that an attractive balance probably will be restored within a few years, but, fortunately, this is what usually happens.

Body Dissatisfaction Among Adolescent Girls. Sex Differences in Muscle and Fat The spurt in height during adolescence is accompanied by an increase in weight that results from an increase in both muscle and fat, but there are important sex differences in adolescent body composition. Before puberty, there are relatively few sex differences in muscle development and only slight sex differences in body fat. In both sexes, muscular development is rapid during puberty, but muscle tissue grows faster in boys than girls (Bogin, 2011). In contrast, body fat increases for both sexes during puberty, but more so for females than for males, especially during the years just before puberty. (For boys, there is actually a slight decline in body fat just before puberty.) The end result of these sex differences is that boys finish adolescence with a muscle-to-fat ratio of about 3 to 1, but the comparable ratio for girls is approximately 5 to 4. This has important implications for understanding why sex differences in strength and athletic ability often appear for the first time during adolescence. According to one estimate, about half of the sex difference in athletic performance during early adolescence results simply from the difference in body fat (Smoll & Schutz, 1990).

secondary sex characteristics The manifestations of sexual maturity at puberty, including the development of breasts, the growth of facial and body hair, and changes in the voice.

The rapid increase in body fat among females in early adolescence frequently prompts girls to become overly concerned about their weight—even when their weight is within the normal range for their height and age (Calzo et al., 2012). As you will read later in this chapter, adolescence is the period of greatest risk for the development of eating disorders such as anorexia, bulimia, and binge eating disorder. One study of college undergraduates found that women who recalled being unprepared for and disliking going through puberty were at relatively greater risk for developing an eating disorder many years later (Moore, McKone, & Mendle, 2016).

Although the majority of girls diet unnecessarily during this time in response to the increase in body fat, the girls who are most susceptible to feelings of dissatisfaction with their bodies during this phase of development are those who mature early and begin dating early (Smolak, Levine, & Gralen, 1993). Girls who spend a lot of time talking about their looks with their friends, who are teased about their weight (especially by boys), or who are pressured to be thin are especially vulnerable to feelings of body dissatisfaction (Webb & Zimmer-Gembeck, 2013; Webb et al., 2015). Girls' body dissatisfaction is often blamed on the impact of the mass media's excessively positive portrayal of thinness, but studies show that it is comparing themselves with their friends, and not just being exposed to media imagery, that leads to unhappiness about their appearance (Ferguson, Muñoz, Garza, & Galindo, 2014), and that adolescent girls' conversations about their looks are affected by the media images they are exposed to in a way that leads them to reinforce each other (Rousseau & Eggermont, 2017; Trekels & Eggermont, 2017), in part because girls who are especially weight-conscious often hang around with peers who share the same concerns (O'Connor, Burt, VanHuysse, & Klump, 2016).

There are also important ethnic and cross-cultural differences in the ways in which adolescent girls feel about their changing bodies. In many parts of the world, including North and South America, Europe, and Asia, there is strong pressure on girls to be thin (Jones & Smolak, 2011). Black adolescents seem less vulnerable to these feelings of body dissatisfaction than other girls (Ali, Rizzo, & Heiland, 2013; Jung & Forbes, 2013), and consequently they are less likely to diet, in part because of ethnic differences in conceptions of the ideal body type (Granberg, Simons, & Simons, 2009). Consistent with this, a recent study of Black girls found that early maturers who were *not* dating were more likely to be depressed than those who were romantically involved (Carter, Caldwell, Matusko, & Jackson, 2015).

Sexual Maturation

Puberty brings with it a series of developments associated with sexual maturation. In both boys and girls, the development of **secondary sex characteristics** is typically

Table 1.1 The sequence of physical changes at puberty

Girls		Boys	
Age of First Appearance (Years)	**Characteristic**	**Age of First Appearance (Years)**	**Characteristic**
1. 7–13	Growth of breasts	1. 10–13½	Growth of testes, scrotal sac
2. 7–14	Growth of pubic hair	2. 10–15	Growth of pubic hair
3. 9½–14½	Body growth	3. 10½–16	Body growth
4. 10–16½	Menarche	4. 11–14½	Growth of penis
5. About two years after pubic hair	Underarm hair	5. About the same time as penis growth	Change in voice (growth of larynx)
6. About same time as underarm hair	Oil- and sweat-producing glands	6. About two years after pubic hair appears	Facial and underarm hair
		7. About same time as underarm hair	Oil- and sweat-producing glands, acne

Source: Goldstein, B. (1976).

divided into five stages, often called **Tanner stages**, after the British pediatrician who devised the categorization system.

Sexual Maturation in Boys The sequence of developments in secondary sex characteristics among boys is fairly orderly (see Table 1.1). Generally, the first stages of puberty involve growth of the testes and scrotum, accompanied by the first appearance of pubic hair. Approximately 1 year later, the growth spurt in height begins, accompanied by growth of the penis and further development of pubic hair—now coarser and darker. The five Tanner stages of penis and pubic hair growth in boys are shown in Figure 1.3.

The emergence of facial and body hair are relatively late developments. The same is true for the deepening of the voice, which is gradual and generally does not occur until very late adolescence. During puberty, there are changes in the skin as well. The skin becomes rougher, especially around the upper arms and thighs, and there is increased development of the sweat glands, which often gives rise to acne, pimples, and increased oiliness of the skin.

Other, internal changes that permit ejaculation occur that are important elements of sexual maturation. At the time that the penis develops, the seminal vesicles, the prostate, and the bulbourethral glands also enlarge and develop. The first ejaculation of seminal fluid generally occurs about one year after the beginning of accelerated penis growth, although this is often determined culturally rather than biologically, since for many boys' first ejaculation occurs as a result of masturbation (J. Tanner, 1972). One interesting observation about the timing and sequence of pubertal changes in boys is that they are generally fertile (i.e., capable of fathering a child) before they have developed an adultlike appearance (Bogin, 2011). As you will read in the next section, the opposite is true for girls.

Sexual Maturation in Girls The sequence of development of secondary sex characteristics among girls (shown in Table 1.1) is less regular than it is among boys. Usually, the first sign of sexual maturation in girls is the elevation of the breast—the emergence of the "breast bud." In about one-third of all adolescent girls, however, the appearance of pubic hair precedes breast development. The development of pubic hair in females follows a sequence similar to that in males—generally, from sparse, downy, light-colored hair to denser, curlier, coarser, darker hair. Breast development often occurs concurrently with the growth of pubic hair and generally proceeds through several stages during which the shape and definition of the nipple and areola change. The female breast undergoes these changes at puberty regardless of changes in breast size (which is why breast size alone is a poor indicator of pubertal maturation). The five Tanner stages of breast and pubic hair growth in girls are shown in Figure 1.4.

As is the case for boys, puberty brings important internal changes for adolescent girls that are associated with the development of reproductive capacity. In girls, these changes involve development and growth of the uterus, vagina, and other aspects of the reproductive system. In addition, there is enlargement of the labia and clitoris.

As is apparent in Table 1.1, the growth spurt is likely to occur during the early and middle stages of breast and pubic hair development. **Menarche**, the beginning of menstruation, is a relatively late development. Generally, full reproductive function does not occur until several years after menarche, and regular ovulation follows menarche by about two years (Bogin, 2011). Unlike boys, therefore, girls generally appear physically mature before they are fertile.

Tanner stages
A widely used system that describes the five stages of pubertal development.

menarche
The time of first menstruation, one of the most important changes to occur among females during puberty.

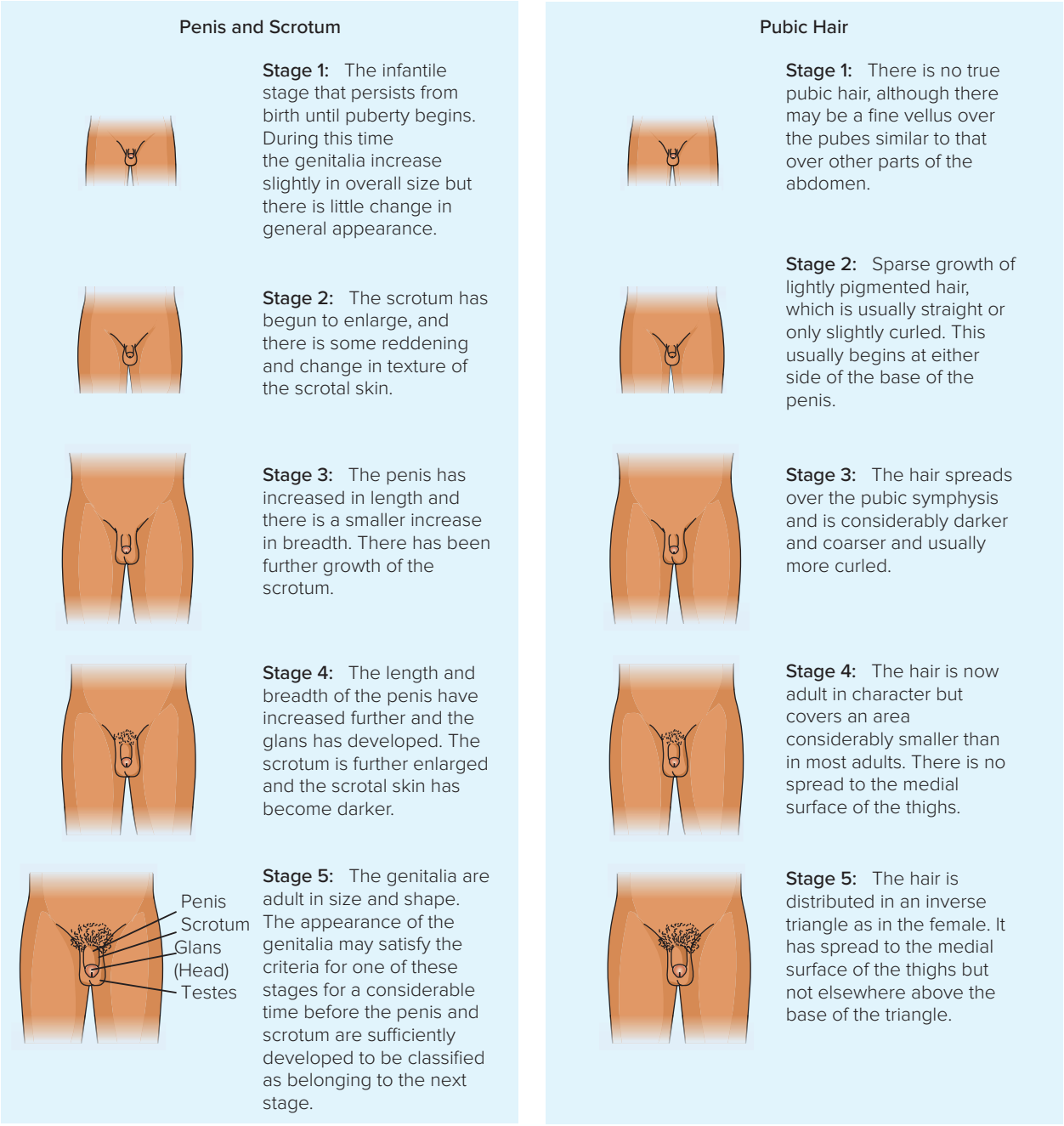

Figure 1.3 **The five pubertal stages for penile and pubic hair growth.** (From Morris & Udry, 1980)

The Timing and Tempo of Puberty

Thus far, no mention has been made of the "normal" ages at which various pubertal changes are likely to take place. This is because variations in the timing of puberty (the age at which puberty begins) and in the tempo of puberty (the rate at which maturation occurs) are so great that it is misleading to talk even about average ages. As you'll read, differences among adolescents in when and how quickly they go through puberty, how synchronized the different changes on puberty are, and how adolescents perceive their own pace of development all have important mental health implications (Mendle, 2014).

Variations in the Timing and Tempo of Puberty

The onset of puberty can occur as early as age 5 in girls and 6 in boys, or as late as age 13 in girls and 13 in boys. In girls, the interval between the first sign of puberty and

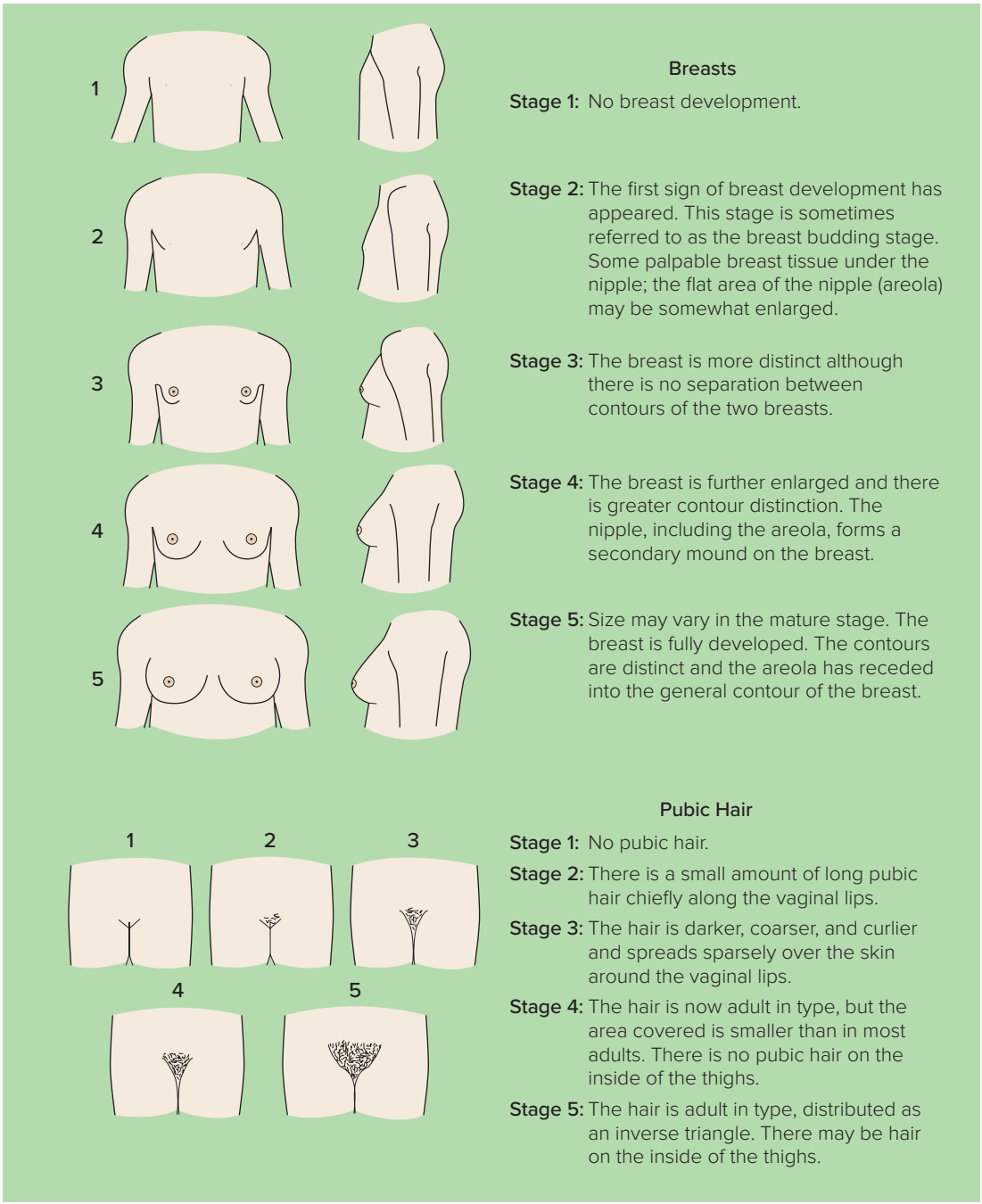

Figure 1.4 **The five pubertal stages for breast and pubic hair growth.** (From Marshall & Tanner, 1969)

complete physical maturation can be as short as a year and a half or as long as 6 years. In boys, the comparable interval ranges from about 2 to 5 years (J. Tanner, 1972). Think about it: Within a totally normal population of young adolescents, some individuals will have completed the entire sequence of pubertal changes before others have even begun. In more concrete terms, it is possible for an early-maturing, fast-maturing youngster to complete pubertal maturation by age 10—3 years before a late-maturing youngster has even begun puberty, and 8 years before a late-maturing, slow-maturing youngster has matured completely!

There is no relation between the age at which puberty begins and the rate at which pubertal development proceeds. The timing of puberty may have a small effect on one's ultimate height or weight, however, with late maturers, on average, being taller than early maturers as adults, and early maturers, on average, being

Individuals vary considerably in when puberty begins and the rate with which it progresses. ©Peathegee Inc/Getty Images

somewhat heavier—at least among females (St. George, Williams, & Silva, 1994). Adult height and weight are far more strongly correlated with height and weight during childhood than with the timing of puberty, however (Pietiläinen et al., 2001).

Within the United States, there are ethnic differences in the timing and rate of pubertal maturation. Several large-scale studies of U.S. youngsters indicate that Black girls mature significantly earlier than Mexican American girls, who, in turn, mature earlier than White girls (Chumlea et al., 2003; Herman-Giddens et al., 1997). Although the reasons for this ethnic difference are not known, it does not appear to be due to ethnic differences in income, weight, or area of residence (S. E. Anderson, Dallal, & Must, 2003). One possible explanation for the earlier maturation of non-White girls is that they may be more frequently exposed to chemicals in the environment that stimulate earlier puberty, such as those contained in certain hair care products and cosmetics (Susman & Dorn, 2009).

Genetic and Environmental Influences on Pubertal Timing

Why do some individuals mature relatively early and others relatively late? Researchers who study variability in the onset and timing of puberty approach the issue in two ways. One strategy involves the study of differences among individuals (i.e., studying why one individual matures earlier or faster than another). The other involves the study of differences among groups of adolescents (i.e., studying why puberty occurs earlier or more rapidly in certain populations than in others). Both sets of studies point to both genetic and environmental factors (Ge, Natsuaki, Neiderhiser, & Reiss, 2007).

Individual Differences in Pubertal Maturation Comparisons of identical and nonidentical twins, which allow scientists to estimate how much a given trait is genetically determined, indicate that the timing and tempo of an individual's pubertal maturation are largely inherited (Mustanski, Viken, Kaprio, Pulkkinen, & Rose, 2004). A specific region on chromosome 6 has been identified as one of the markers for pubertal timing in both boys and girls (Bogin, 2011).

Despite this powerful influence of genetic factors, the environment plays an important role. In all likelihood, every individual inherits a predisposition to develop at a certain rate and to begin pubertal maturation at a certain time. But this predisposition is best thought of as an upper and lower age limit, not a fixed absolute. Whether the genetic predisposition that each person has to mature around a given age is actually realized, and when within the predisposed age boundaries she or he actually goes through puberty, is influenced by many external factors. In other words, the timing and tempo of pubertal maturation are the product of an interaction between nature and nurture.

By far the two most important environmental influences on pubertal maturation are nutrition and health. Puberty occurs earlier among individuals who are better nourished and grow more throughout their prenatal, infant, and childhood years, whereas delayed puberty is more likely to occur among individuals with a history of protein and/or caloric deficiency (Terry, Ferris, Tehranifar, Wei, & Flom, 2009). Chronic illness during childhood and adolescence is also associated with delayed puberty, as is excessive exercise. Generally, then, after genetic factors, the most important determinant of the timing of puberty is the overall physical well-being of the individual from conception through preadolescence (Susman & Dorn, 2009).

Familial Influences on Pubertal Timing A number of studies have shown that social factors in the home environment also influence the onset of maturation, especially in girls. Puberty occurs somewhat earlier among girls who grew up in father-absent families, in less cohesive or more conflict-ridden households, or with a stepfather (Culpin, Heron, Araya, & Johnson, 2015; Ellis, 2004); early puberty is also more common among girls who were sexually abused during childhood (Mendle, Leve, Van Ryzin, & Natsuaki, 2014; Mendle, Ryan, & McKone, 2016; Negriff, Blankson, & Trickett, 2014).

One explanation for the finding that family conflict may accelerate pubertal maturation is that tension in the family may induce stress, which, in turn, may affect hormonal secretions in the adolescent (Belsky, Steinberg, Houts, & Halpern-Felsher, 2010; Belsky, Ruttle, Boyce, Armstrong, & Essex, 2015; Saxbe, Negriff, Susman, & Trickett, 2015), especially among girls who are genetically susceptible to this influence

(Ellis, Shirtcliff, Boyce, Deardorff, & Essex, 2011; Hartman, Widaman, & Belsky, 2015). (Other types of stress, like economic stress, hasten the onset of puberty, too; Sun, Mensah, Azzopardi, Patton, & Wake, 2017.) Interestingly, having a secure infant-mother attachment seems to protect against the impact of harsh parenting on pubertal timing (Sooyeon et al., 2016). In addition, the presence of a stepfather may expose the adolescent girl to **pheromones** (a class of chemicals secreted by animals that stimulate certain behaviors in other members of the species) that stimulate pubertal maturation. In general, among humans and other mammals, living in proximity to one's close biological relatives appears to slow the process of pubertal maturation, whereas exposure to unrelated members of the other sex may accelerate it.

Although it may seem surprising that something as biological as puberty can be influenced by factors in the social environment, scientists have long known that our social relationships affect our biological functioning. One of the best-known examples of this is that women who live together—such as dormitory roommates—find that their menstrual periods begin to synchronize over time (McClintock, 1980).

Group Differences in Pubertal Maturation Unlike differences among adolescents growing up in the same environment, which are mainly due to genetics, differences among countries in the average rate and timing of puberty are more likely to reflect differences in their environments (Bogin, 2011).

The influence of the broader environment on the timing and tempo of puberty can be seen in more concrete terms by looking at two sets of findings: (1) comparisons of the average age of menarche across countries and (2) changes in the average age of menarche over time. Although menarche does not signal the onset of puberty, researchers often use the average age of menarche when comparing the timing of puberty across different groups or historical eras, because it can be measured more reliably than other indicators. And while the age of menarche doesn't directly reflect when males in that same group are going through puberty, it does so indirectly, because in places where girls mature early, boys mature early, too (Steinberg, 2014a).

Given the importance of nutrition and health as influences on pubertal timing, it comes as no surprise that menarche generally is earlier in countries where individuals are less likely to be malnourished or to suffer from chronic disease (Bogin, 2011). For example, in Western Europe and in the United States, the median age of menarche ranges from about 12 to 13½ years. In Africa, however, the median age ranges from about 14 to 17 years. The range is much wider across Africa because of the greater variation in environmental conditions there.

The Secular Trend We can also examine environmental influences on the timing of puberty by looking at changes in the average age of menarche over the past two centuries. Because nutritional conditions have improved during the past 150 years, we would expect to find a decline in the average age at menarche over time. This is indeed the case, as can be seen in Figure 1.5. This pattern, known as the **secular trend**, is attributable not only to improved nutrition but also to better sanitation and better control of infectious diseases. In most European countries, maturation has become earlier by about 3 to 4 months per decade. For example, in Norway 150 years ago, the average age of menarche may have been about 17 years. Today, it is between 12 and 13 years. Similar declines have been observed over the same period in other industrialized nations and, more recently, in developing countries as well. In China, for example, the average age of menarche dropped by nearly 2 years between 1991 and 2011 (Meng, Li, Duan, Sun, & Jia, 2017).

pheromones
A class of chemicals secreted by animals that stimulate certain behaviors in other members of the species.

secular trend
The tendency, over the past two centuries, for individuals to be larger in stature and to reach puberty earlier, primarily because of improvements in health and nutrition.

The secular trend is less well documented among boys, in part because there is no easily measured marker

Scientists have expressed concern about the continuing decline in the age when puberty begins, because pubertal hormones affect the developing brain in ways that increase sensation seeking. ©Rose Hayes/Shutterstock

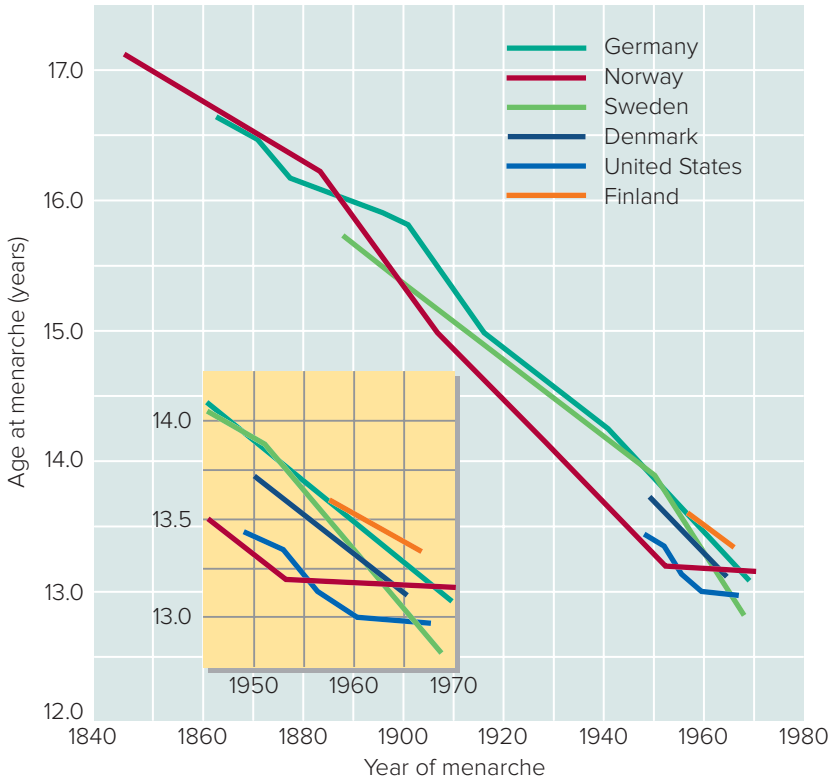

Figure 1.5 **The age at menarche has declined considerably over the past 150 years. This decline is known as the secular trend.** (Adapted from Eveleth & Tanner, 1990)

of puberty, like menarche. One unusual factoid that is consistent with the decline in the age of puberty among boys over many centuries, though, is the observation that the average age at which boys experience their voice breaking (a sign of male pubertal development), based on reports from European children's choirs, dropped from about 18 in the mid-1700s to around 10 today (Mendle & Ferrero, 2012). The drop in the age of male puberty appears to be continuing, and has fallen during the past three decades (Herman-Giddens et al., 2012). Interestingly, although puberty is starting earlier, there is some evidence that it is taking longer to complete, meaning that children are spending more time in the midst of puberty than ever before (Mendle, 2014).

The average age of puberty among American adolescents has continued to decline, most probably because of increased rates of obesity, which affects leptin levels (Currie et al., 2012); exposure to certain man-made chemicals in cosmetics, food, and the environment that affect development by mimicking actual pubertal hormones; and increased exposure to artificial light, which affects melatonin secretion (Greenspan & Deardorff, 2014).

One reason scientists have expressed concern about the continuing decline in the age when puberty begins is that pubertal hormones affect the developing brain in ways that make adolescents more inclined to engage in sensation seeking (Steinberg, 2014). Brain systems that govern self-regulation are less influenced by puberty, so the secular trend has not affected the age at which the maturation of impulse control takes place. If the increase in sensation seeking is taking place before children are able to regulate urges to do exciting things, it may lead to increases in risky and reckless behavior, especially when the risk taking is impulsive (Khurana et al., 2012). The end result is that, as the age of puberty has dropped, the amount of time elapsed between the arousal of sensation seeking and the maturation of self-control has grown, creating a larger window of vulnerability to risky behavior (Steinberg, 2014). Consistent with this, as the age of puberty has fallen, rates of adolescent mortality have risen (Mendle, 2014).

making the scientific connection

Some studies indicate that the secular trend has been more dramatic among females than males. Why might this be the case?

The Psychological and Social Impact of Puberty

Puberty can affect the adolescent's behavior and psychological functioning in a number of ways (Hollenstein & Lougheed, 2013). First, the biological changes of puberty

Contrary to widespread belief, there is little evidence that the hormonal changes of puberty contribute in a dramatic way to adolescent moodiness. ©Westend61/Getty Images

can have a direct effect on behavior. For example, increases in testosterone at puberty are directly linked to an increase in sex drive and sexual activity among adolescent boys (Halpern, Udry, & Suchindran, 1996). (The impact of hormonal change on girls' sex drive and sexual activity is more complicated, because girls' sexual activity is significantly influenced by contextual factors.)

Second, the biological changes of puberty may change the adolescent's self-image, which, in turn, may affect how he or she behaves. For example, a boy who has recently gone through puberty may feel more grown up as a result of his more adultlike appearance. This, in turn, may make him seek more independence from his parents. He may ask for a later curfew, a larger allowance, or the right to make decisions about things that previously were decided by his parents. As we will see later in this chapter, the physical changes of puberty often spark conflict between teenagers and their parents, in part because of the ways in which puberty affects the adolescent's desire for autonomy.

Finally, biological change at puberty transforms the adolescent's appearance, which, in turn, may elicit changes in how *others* react to the teenager (Lougheed, Hollenstein, & Lewis, 2016). These changes in reactions may provoke changes in the adolescent's behavior. An adolescent girl who has recently matured physically may find herself suddenly receiving the attention of older boys who had not previously noticed her. She may feel nervous about all the extra attention and confused about how she should respond to it. Moreover, she must now make decisions about how much time she wishes to devote to dating and how she should behave when out with someone who is sexually interested in her.

cross-sectional study
A study that compares two or more groups of individuals at one point in time.

longitudinal study
A study that follows the same group of individuals over time.

Researchers have generally taken two approaches to studying the psychological and social consequences of puberty. One approach is to look at individuals who are at various stages of puberty, either in a **cross-sectional study** (in which groups of individuals are compared at different stages of puberty) or in a **longitudinal study** (in which the same individuals are tracked over time as they mature through the different stages of puberty). Studies of this sort examine the impact of puberty on young people's psychological development and social relations. Researchers might ask, for example, whether youngsters' self-esteem is higher or lower during puberty than before or after.

A second approach compares the psychological development of early and late maturers. Because there is large variation in pubertal timing, individuals of the same chronological age and who are in the same grade in school may be at very different stages of puberty. How does being early or late to mature affect the adolescent's psychological development? Here, a typical question might be whether early maturers are more popular in the peer group than are late maturers.

The Immediate Impact of Puberty

Studies of the psychological and social impacts of puberty indicate that physical maturation, regardless of whether it occurs early or late, affects the adolescent's self-image, mood, and relationships with parents.

Puberty and Self-Esteem Although puberty can be a potential stressor with temporary adverse psychological consequences, this is true only when it is coupled with other changes that necessitate adjustment (Susman & Dorn, 2009). The impact of puberty on self-esteem varies by gender and across ethnic groups, with girls more adversely affected than boys, and with White girls, in particular, at greatest risk for developing a poor body image (J. Siegel, Yancey, Aneshensel, & Schuler, 1999). Given the premium in contemporary American society placed on thinness, the increase in body dissatisfaction among White girls that takes place at puberty is, not surprisingly, linked to specific concerns that girls have about their hips, thighs, waist, and weight. Interestingly, the way adolescents feel about their physical appearance when they begin adolescence remains remarkably stable over time, regardless of whether their actual attractiveness changes (Rosenblum & Lewis, 1999).

Puberty and Adolescent Moodiness Although an adolescent's self-image can be expected to change during a time of dramatic physical development, self-esteem

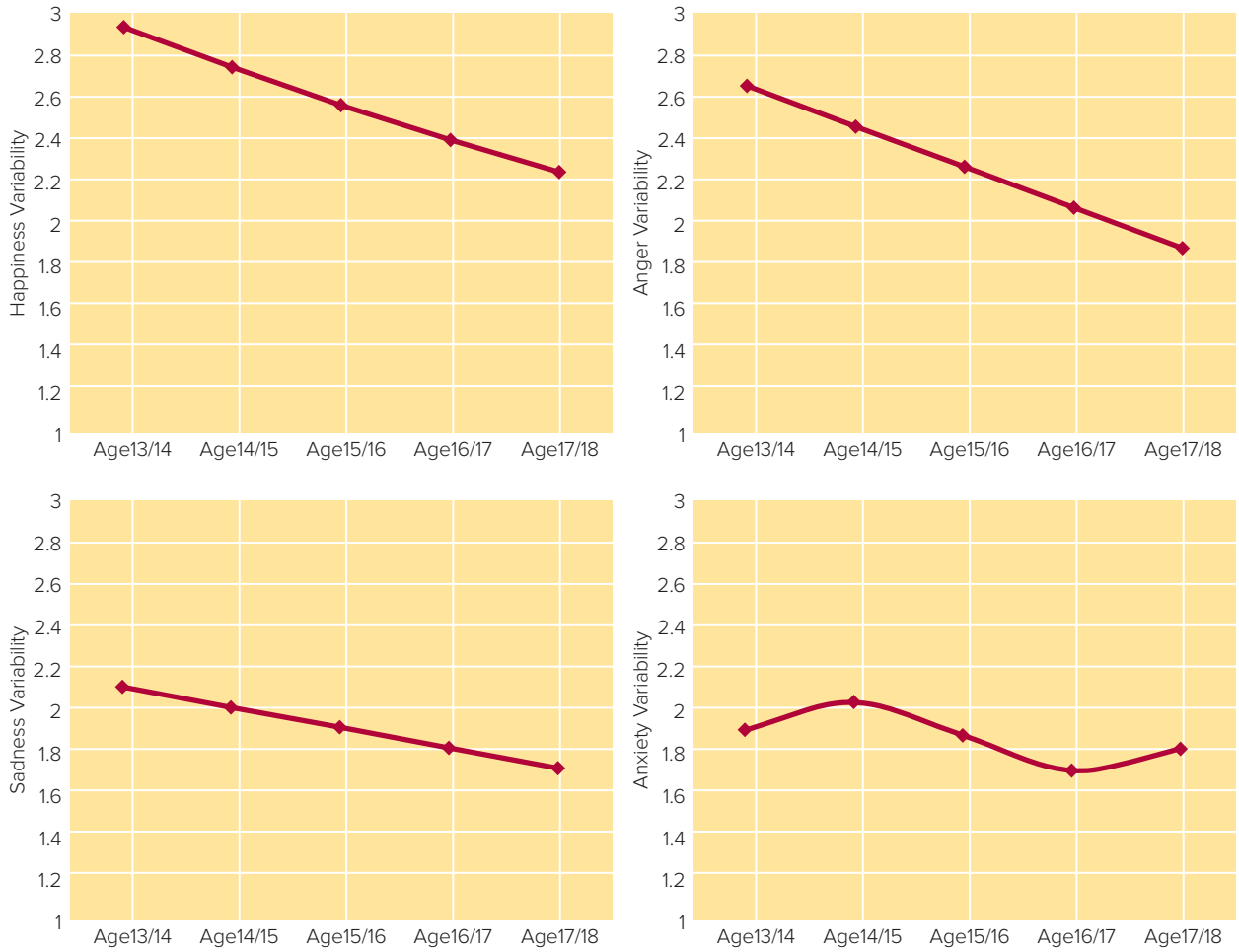

Figure 1.6 **Children become less moody as they get older.** (Figure 1, from Maciejewsk, van Lier, Branje, Meeus, & Koot, 2015)

or self-image is reasonably stable over time, with long and sturdy roots reaching back to childhood. For this reason, some researchers have turned their attention to the impact of puberty on more transient states, such as mood. One reason for this focus is that adolescents are thought to be moodier, on average, than either children or adults. One classic study, in which adolescents' moods were monitored repeatedly by electronic pagers, for example, showed that their moods fluctuate during the course of the day more than do the moods of adults (Csikszentmihalyi & Larson, 1984). Teenagers become less moody as they get older (Maciejewski, van Lier, Branje, Meeus, & Koot, 2015) (see Figure 1.6).

Many adults assume that adolescent moodiness is directly related to the hormonal changes of puberty (Buchanan, Eccles, & Becker, 1992). Is there any scientific evidence that the hormonal changes of puberty cause adolescents to be moody or, for that matter, that these hormonal changes affect the adolescent's psychological functioning or behavior at all?

According to several comprehensive reviews of research on hormones and adolescent mood and behavior, the direct connection between hormones and mood is not very strong (Duke, Balzer, & Steinbeck, 2014). When studies do find a connection between hormonal changes at puberty and adolescent mood or behavior, the effects are strongest early in puberty, when the process is being "turned on" and when hormonal levels are more likely to fluctuate. However, pubertal hormones affect brain systems responsible for emotional arousal in ways that make adolescents more responsive to what is going on around them socially (Forbes, Phillips, Silk, Ryan, & Dahl, 2011; Masten et al., 2011; Motta-Mena & Scherf, 2017; Op de Macks et al., 2017). For example, *rapid* increases in many of the hormones associated with puberty—such as testosterone, estrogen, and various adrenal androgens—may be associated with increased irritability, impulsivity, aggression (in boys) and depression (in girls), especially when the increases take place very early in adolescence. One interpretation of these findings is that it is not so much the absolute increases in these hormones during puberty but their rapid fluctuation early in puberty that may affect adolescents' moods. Once the hormone levels stabilize at

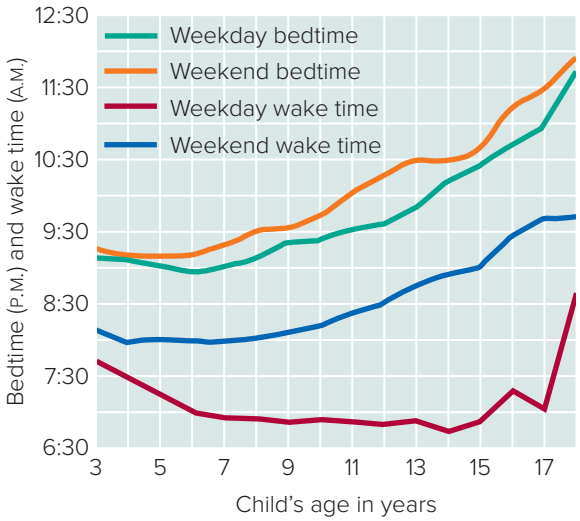

Figure 1.7 Children's weekday and weekend bedtimes and wake times, by age. (Adapted from Snell, Adam, & Duncan, 2007)

higher levels, later in puberty, their negative effects wane (Buchanan et al., 1992).

Although rapid increases in hormones early in puberty are associated with depressed mood in girls, it turns out that stressful life events, such as problems in the family, in school, or with friends, play a far greater role in the development of depression and negative moods than do hormonal changes (Brooks-Gunn, Graber, & Paikoff, 1994; Santiago et al., 2017). Similarly, while high levels of testosterone have been associated with impulsivity and aggression and low levels with depression, these associations are weaker among adolescents who have positive family relationships or strong self-control (A. Booth, Johnson, Granger, Crouter & McHale, 2003; Reardon, Herzhoff, & Tackett, 2016).

In other words, there is little evidence that adolescents' moodiness results exclusively from the "storm and stress" of raging hormones. Over the course of a day, a teenager may shift from elation to boredom, back to happiness, and then to anger. But these shifts in mood appear to have more to do with shifts in activities—elated when seeing a girlfriend, bored during biology, happy when having lunch with friends, and angry when assigned extra chores around the house—than with internal, biological changes (Schneiders et al., 2006). Not surprisingly, adolescents' moods fluctuate over the course of the school year, too, with teenagers reporting the highest levels of anxiety and stress at the end of the school year (Verma, Allen, Trinder, & Bei, 2017).

Puberty and Changes in Patterns of Sleep Many parents complain that their teenage children go to bed too late in the evening and sleep in too late in the morning, a pattern that begins to emerge in early adolescence (see Figure 1.7). It now appears that the emergence of this pattern—called a **delayed phase preference**—is driven by the biological changes of puberty, and it is seen not only in humans, but in other mammals as well (Carskadon, 2011).

delayed phase preference A pattern of sleep characterized by later sleep and wake times, which usually emerges during puberty.

Falling asleep is caused by a combination of biological and environmental factors. One of the most important is the secretion of melatonin, which, as you know, plays a role in triggering puberty. Melatonin levels change naturally over the course of the 24-hour day, mainly in response to the amount of light in the environment. Feelings of sleepiness increase and decrease with melatonin levels—as melatonin rises, we feel sleepier, and as it falls, we feel more awake. Over the course of the day, we follow a sleep–wake cycle that is calibrated to changes in light and regulated by melatonin secretion.

During puberty, the time of night at which melatonin levels begin to rise changes, becoming later and later as individuals mature physically. In fact, the nighttime increase in melatonin starts about 2 hours later among adolescents who have completed puberty than among those who have not yet begun (Carskadon & Acebo, 2002). As a result of this shift, individuals become able to stay up later before feeling sleepy (Hummer & Lee, 2016). In fact, when allowed to regulate their own sleep schedules (as on weekends), most teenagers will stay up until around 1:00 A.M. and sleep until about 10:00 A.M. Because the whole cycle of melatonin secretion is shifted later at puberty, this also means that once adolescents have gone through puberty, they are more sleepy early in the morning than they had been before puberty.

Important changes in the sleep cycle take place after puberty. This "delayed phase preference" causes adolescents to want to stay up later at night and makes them feel more tired in the early morning hours. ©CORBIS/AGE Fotostock

Falling asleep is affected by the environment as well—it's much easier to fall asleep when a room is dark than when it's bright. When preadolescents get into bed at night, they tend to fall asleep very quickly—even if there is something that they want to stay up for—because their melatonin levels are already high. After going through puberty, though, because of the delayed timing of the increase in melatonin, it is easier for individuals to stay up later, so that if there is something more exciting to do—check an Instagram post, play a video game, text a friend—it is not difficult to remain awake (Gentile, Berch, Choo, Khoo, & Walsh, 2017). Thus, the tendency for adolescents to stay up late is due to the interaction of biology (which delays the onset of sleepiness) and the environment (which provides a reason to stay up). This shift in sleep preferences, to a later bedtime and a later wake time, begins to reverse around age 20, at a slightly earlier age among females than males (Fischer, Lombardi, Marucci-Wellman, & Ronneberg, 2017). The end result is that there is a marked decline in the amount of sleep people get each night during adolescence followed by an increase during the early 20s (Maslowsky & Ozer, 2014).

If getting up early the next day were not an issue, staying up late would not be a problem. Unfortunately, most teenagers need to get up early on school days, and the combination of staying up late and getting up early leads to sleep deprivation and daytime sleepiness (Tarokh, Saletin, & Carskadon, 2016). The shift in the timing of the melatonin cycle contributes to this; when teenagers get out of bed early in the morning, their melatonin levels are relatively higher than they are at the same time of day for preadolescents. Ironically, adolescents are least alert between the hours of 8:00 and 9:00 A.M. (when most schools start) and most alert after 3.00 P.M., when the school day is over (R. Allen & Mirabell, 1990). Because of early school start times, adolescents get two fewer hours of sleep per night when the school year begins than they did during the preceding summer months (Hansen, Janssen, Schiff, Zee, & Dubocovich, 2005). This has prompted many experts to call for communities to delay their school starting times (Paksarian, Rudolph, He, & Merikangas, 2015).

The tendency for individuals to go to bed later as they become teenagers has become stronger over the past 30 years (Keyes, Maslowsky, Hamilton, & Schulenberg, 2015), perhaps because the availability of television, the Internet, and other electronic media during late-night and early-morning hours has increased (Adolescent Sleep Working Group, 2014). This suggests that the late-night hours kept by many adolescents are voluntary, but made easier by the changes in the sleep centers of the brain. There is also evidence that exposure to light depresses melatonin secretion, so that staying up late with the lights on or staring at a computer, smartphone, tablet, or TV screen will delay the rise in melatonin even more; using eyeglasses that block the blue-wavelength light emitted by these screens can help reduce the adverse effects of screen light on sleep (van der Lely et al., 2015). It has also been suggested that the demands of school and extracurricular activities are taking their toll on adolescents' sleep by keeping them busy into the late hours. Whatever the reason, because teenagers' wake time has not changed, but their bedtime has gotten later, today's teenagers get significantly less sleep than their counterparts did several decades ago. In the early 1990s, one-third of American 15-year-olds reported getting adequate sleep most nights; today fewer than 25% do (Keyes et al., 2015).

Although individuals' preferred bedtime gets later as they move from childhood into adolescence, the amount of sleep they need each night remains constant, at around nine hours. There is now a consensus among scientists that most teenagers are not getting enough sleep, and that inadequate sleep in adolescence leads to all sorts of problems, including depression (Pieters et al., 2015; Van Zundert, van Roekel, Engels, & Scholte, 2015); alcohol, tobacco, and illicit drug use (Pasch, Latimer, Cance, Moe, & Lytle, 2012); obesity (Turel, Romashkin, & Morrison, 2016); cognitive impairment (Rossa, Smith, Allan, & Sullivan, 2014; Thomas, Monahan, Lukowski, & Cauffman, 2015); worse relationships (Tavernier & Willoughby, 2015); poor school performance (Lin & Yi, 2014); and delinquency (McGlinchey & Harvey, 2015). Many of the negative consequences of sleep deprivation are due to its adverse impact on self-control (Barnes & Meldrum, 2015; Tashjian, Goldenberg, & Galvan, 2017; Warren, Riggs, & Pentz, 2017). The good news is that getting just one additional hour of sleep each night has been shown to significantly improve adolescents' well-being (Winsler, Deutsch, Vorona, Payne, & Szklo-Coxe, 2015).

Despite many adolescents' belief that catching up on sleep on weekends will make up for sleep deprivation during the week, having markedly different bedtimes on weekends versus weekdays actually contributes to further sleep-related problems (Wolfson & Carskadon, 1998). The best thing teenagers can do to avoid problems waking up on school days is to force themselves to get up at the same time on the weekend as on school days, regardless of how late they have stayed up.

Puberty and Family Relationships Research into the impact of puberty on family relationships has found that puberty appears to increase conflict and distance between parents and children, although the "distancing" effect of puberty on adolescent-parent relationships is not as consistently observed in ethnic minority families (Sagrestano, McCormick, Paikoff, & Holmbeck, 1999). In White families, however, as youngsters mature from childhood toward the middle of puberty, emotional distance between them and their parents increases, and

conflict intensifies, especially between adolescents and mothers (Laursen, Coy, & Collins, 1998). The change that takes place is reflected in an increase in "negatives" (e.g., conflict, complaining, anger) and, to a lesser extent, a decrease in "positives" (e.g., support, smiling, laughter) (Flannery, Torquati, & Lindemeier 1994). Although negative interchanges may diminish after mid-puberty, adolescents and their parents do not immediately regain the closeness they had previously. Interestingly, puberty also increases distance between children and their parents in most species of monkeys and apes, and some writers have suggested that the pattern seen in human adolescents may have some evolutionary basis—it helps ensure that once they mature sexually, adolescents will leave home and mate outside the family (Steinberg & Belsky, 1996).

This connection between pubertal maturation and parent-child distance is not affected by the age at which the adolescent goes through puberty—the pattern is seen among early as well as late maturers. To date, we do not know whether this effect results from the hormonal changes of puberty (which may make young adolescents more testy), from changes in the adolescent's physical appearance (which may change the way parents treat their adolescent), or from changes in other aspects of adolescents' psychological functioning that are affected by puberty and, in turn, affect family relationships (like newfound interest in dating).

Pubertal Maturation and Peer Relationships

Puberty may have an effect on relationships in the peer group, too. Boys and girls who are physically mature are more likely than their less mature peers to be involved in cross-sex romantic activities such as having a boyfriend or girlfriend (Compian, Gowen, & Hayward, 2004), although this depends on the social norms of the adolescent's peer group and the prevailing expectations about the age at which teenagers should begin dating (Gargiulo, Attie, Brooks-Gunn, & Warren, 1987). Pubertal maturation is *not* associated with having platonic relationships with other-sex peers, however (Compian et al., 2004). It is the case, though, that adolescents tend to be similar to their friends in how physically mature they are, perhaps because they are more likely to share common interests, such as socializing with potential romantic partners (Kretsch, Mendle, Cance, & Harden, 2016).

The Impact of Specific Pubertal Events

Several studies have focused specifically on adolescents' attitudes toward and reactions to particular events at puberty, such as girls' reactions to menarche or breast development and boys' reactions to their first ejaculation.

In general, most adolescents react positively to the biological changes associated with puberty, especially those associated with the development of secondary sex characteristics. Girls' attitudes toward menarche are less negative today than they were in the past (J. Lee, 2008), a change that may be attributable to the increase in information about menstruation provided in schools and in the media (Merskin, 1999). Nevertheless, many young women have developed a negative image of menstruation before reaching adolescence, and they enter puberty with a mixture of excitement and fear (S. Moore, 1995). Girls whose mothers are helpful and matter-of-fact in their response to their daughter's menarche report the most positive memories of the experience (J. Lee, 2008).

Menstrual symptoms are reported to be more severe among women who expect menstruation to be uncomfortable, among girls whose mothers lead them to believe that menstruation will be unpleasant or uncomfortable, and in cultures that label menstruation as an important event. In Mexico and in China, for example, where attitudes toward menarche are especially ambivalent, menarche may have an adverse effect on girls' mental health, an effect not generally observed in the United States (Benjet & Hernandez-Guzman, 2002; Tang, Yeung, & Lee, 2003). In addition, girls who experience menarche early and who are unprepared for puberty report more negative reactions to the event (Koff & Rierdan, 1996; Tang, Yeung, & Lee, 2004).

Far less is known about boys' reactions to their first ejaculation, an experience that is analogous to menarche in girls. Although most boys are not very well prepared for this event by their parents or other adults, first ejaculation does not appear to cause undue anxiety, embarrassment, or fear. In contrast to girls, who generally tell their mothers shortly after they have begun menstruating and tell their friends soon thereafter, boys, at least in the United States, usually do not discuss their first ejaculation with either parents or friends (J. Stein & Reiser, 1994). Cultural differences in boys' responses to their first ejaculation are likely related to differences in how cultures view masturbation. As is the case with girls and menarche, boys' reactions to their first ejaculation are more positive when they have been prepared for the event (J. Stein & Reiser, 1994).

The Impact of Early or Late Maturation

Adolescents who mature relatively early or relatively late stand apart from their peers physically and may elicit different sorts of reactions and expectations from those around them. Adolescents often are all too aware of whether they are early or late relative to their classmates, and their feelings about themselves are likely to be influenced by their comparisons. One study found that early-maturing adolescents were more likely to be "pseudomature"—wishing they were older, hanging around with older peers, less involved in school, and more oriented toward their peers (Galambos, Barker, & Tilton-Weaver, 2003). Indeed, adolescents' *perceptions* of whether they are an early or a late maturer are often more

strongly related to how they feel about and are affected by puberty than whether they actually are early or late (Kretsch, Mendle, & Harden, 2016; Moore, Harden, & Mendle, 2014). Further, adolescents' behavior is related to how old they feel, not simply to how physically mature they are (Galambos, Kolaric, Sears, & Maggs, 1999). Nevertheless, early and late maturers are often treated differently by others and view themselves differently, and as a result, they may behave differently. As we shall see, early and late maturation have different consequences at puberty than in the long run, different consequences in different contexts, and, most important, different consequences for boys and girls.

Early Versus Late Maturation Among Boys

Research on boys' pubertal timing mainly has found that early-maturing boys feel better about themselves and are more popular than their late-maturing peers, although a few studies have found higher rates of depression and anxiety among early-maturing boys than their on-time peers (Mendle & Ferrero, 2012; Negriff & Susman, 2011) and among boys who go through puberty especially rapidly (Mendle, Harden, Brooks-Gunn, & Graber, 2010). And, while they are in the midst of puberty, early maturers lose their temper more often and more intensely than late maturers (Ge et al., 2003). Interestingly, although all adolescents are adversely affected by being bullied by their peers, the impact of victimization is greater for early maturers, perhaps because being picked on when one is larger than average is all the more embarrassing (Nadeem & Graham, 2005).

Although the emotional effects of early maturation on boys are generally positive, early-maturing boys are more likely than their peers to get involved in antisocial or deviant activities, including truancy, minor delinquency, and school misbehavior (Negriff & Susman, 2011). They are also more likely to use drugs and alcohol and engage in other risky activities (Baams, Dubas, Overbeek, & van Aken, 2015; Kogan et al., 2015), even as young adults (Biehl, Natsuaki, & Ge, 2007). One explanation for this is that boys who are more physically mature are less closely supervised by adults and spend more time hanging out in settings in which delinquent behavior is more likely to occur, like parts of neighborhoods where there are few adults around (Kretschmer, Oliver, & Maughan, 2014; Schelleman-Offermans, Knibbe, & Kuntsche, 2014). It is also likely that older-looking boys develop friendships with older peers, who lead them into activities that are problematic for the younger boys (Negriff, Ji, & Trickett, 2011a). Once involved with these older peer groups, the early maturers' higher rate of delinquency and substance use increases over time through their social contacts (Silbereisen, Petersen, Albrecht, & Kracke, 1989).

Early-maturing boys enjoy some psychological advantages over late maturers with respect to self-esteem and admiration from peers during early adolescence, when some boys have matured physically but others have not. But what about later during adolescence, when the late maturers have caught up? It turns out that there may be some interesting advantages for late-maturing boys, despite their initially lower popularity. Although early and late maturers exhibit similar psychological profiles before adolescence, late maturers ultimately score higher on measures of intellectual curiosity and social initiative. Having to cope with the challenges of being a late maturer may help boys develop better coping skills.

Early-maturing boys are more likely to be involved in problem behavior than adolescents who are the same age but slower to mature. ©Alexandra Dudkina/EyeEm/Getty Images

Early Versus Late Maturation in Girls In contrast to the generally positive impact that early maturation has on the emotional well-being of boys, it is well established that early-maturing girls have more emotional difficulties than their peers, including poorer self-image and higher rates of depression, anxiety, eating disorders, and panic attacks (Greenspan & Deardorff, 2014; Negriff & Susman, 2011). These difficulties seem to have less to do with the direct effects of hormones and more to do with the ways in which looking different from their peers affects girls' feelings about their appearance and their relationships with other adolescents (Mendle et al., 2007). For example, depression among early-maturing girls is more highly correlated with their breast development (which is more likely to be visible to others) than their pubic hair development (which is not) (Wang, Lin, Leung, & Schooling, 2016). And the impact of early maturation is worse on girls who are heavier than on their thinner peers (Tanner-Smith, 2010). There is also evidence that early maturation in girls is associated with higher emotional arousal (Graber, Brooks-Gunn, & Warren, 2006). It is not clear, however, whether the

Although they are often more popular than their peers, early-maturing girls are at greater risk for a wide range of emotional and behavioral problems. ©JGI/Jamie Grill/Getty Images

effects of early puberty on depression are limited to adolescence or persist into adulthood (Gaysina, Richards, Kuh, & Hardy, 2015).

Given the role of social factors in linking early maturation and girls' psychological distress, it's no surprise that the ultimate impact of early maturation on the young girl's feelings about herself depends on the broader context in which maturation takes place. Studies of American girls generally find that early-maturing girls have lower self-esteem and a poorer self-image, because of the culture's preference for thinness and ambivalence about adolescent sexuality. The negative effects of early maturation on girls' mental health vary across ethnic groups, however, with more adverse consequences seen among White girls than their Black or Hispanic peers, presumably because puberty is more likely to lead to body dissatisfaction among White girls (Negriff & Susman, 2011). Girls who are prone to ruminate or cope poorly when they have problems seem especially vulnerable to the stress of maturing early (Crockett, Carlo, Wolff, & Hope, 2013; Hamilton, Hamlat et al., 2014). Context matters, though: One recent study of both boys and girls found that the adverse consequences of early puberty were limited to adolescents who came from high-risk households, consistent with the idea that puberty itself isn't inherently stressful but can intensify the effects of other stressors, like transitioning to middle school (Lynne-Landsman, Graber, & Andrews, 2010b; Morales-Chicas & Graham, 2015).

Although some early-maturing girls have self-image difficulties, their popularity with peers is not necessarily jeopardized. Not surprisingly, early maturing girls who are more socially skilled are less likely to have difficulties with their peers (Carter, Halawah, & Trinh, 2018). Early maturers are more popular than other girls, especially, as you would expect, when the index of popularity includes popularity with boys (Simmons, Blyth, & McKinney, 1983). However, although early-maturing girls are often more popular with boys, they are frequent victims of rumors and gossip (Reynolds & Juvonen, 2011; Sontag, Graber, & Clemans, 2011) and are more likely to suffer from social anxiety (Blumenthal et al., 2011). Ironically, then, it may be in part because the early maturer is more popular with boys that she reports more emotional upset: Early pressure to date and, perhaps, to be involved in a sexual relationship may take its toll on girls' mental health. Consistent with this, research indicates that early-maturing girls are more vulnerable to emotional distress when they have relatively more friendships with boys (Ge, Best, Conger, & Simons, 1996) and when they are in schools with older peers (for example, sixth-graders who are in a school that has seventh and eighth-graders, too) (Blyth, Simmons, & Zakin, 1985). Perhaps the problem isn't early maturation as much as it is the way that older boys react to it; one study found that the link between early maturation and depression was due in part to the fact that early-maturing girls are more likely to be sexually harassed (see Figure 1.8). Early-maturing girls also are more likely to be abused by their boyfriends (Chen, Rothman, & Jaffee, 2017).

There are several theories explaining why early maturation is harder on girls than boys (Negriff & Susman, 2011; Rudolph, Troop-Gordon, Lambert, & Natsuaki, 2014). One explanation is the "maturational deviance" hypothesis. Simply put, youngsters who stand far apart from their peers—in physical appearance, for instance—may experience more psychological distress than adolescents who blend in more easily. Because girls on average mature earlier than boys, early-maturing girls mature earlier than both their male and female peers. This makes them really stand out at a time when they would rather

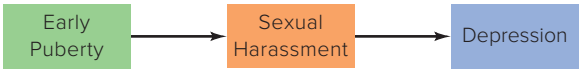

Figure 1.8 One reason for the elevated rates of depression among early-maturing girls is that they are more likely than their peers to be sexually harassed.

fit in and, as a result, may make them more vulnerable to emotional distress. This explanation would also account for the lower self-esteem of late-maturing boys, who deviate toward the other extreme.

A second explanation for the sex difference in the impact of early maturation concerns "developmental readiness." If puberty is a challenge that requires psychological adaptation by the adolescent, perhaps younger adolescents are less ready to cope with the challenge than older ones. Because puberty occurs quite early among early-maturing girls, it may tax their psychological resources. Early maturation among boys, because it occurs at a later age, would pose less of a problem. This also helps to explain why late-maturing boys seem better able than early maturers to control their temper and their impulses when they are going through puberty: They are relatively older and psychologically more mature. If the developmental readiness hypothesis is true, both girls and boys should experience more difficulty if they are early maturers than if they are on time or late, but the difficulty should be temporary. This appears to be the case among boys (for whom the negative effects of early puberty occur during puberty itself, but then fade), but not for girls (for whom the negative effects of early puberty persist) (Ge et al., 2003).

A final explanation for the relatively greater disadvantage of early maturation for girls concerns the cultural desirability of different body types (Petersen, 1988). Early maturation for girls means leaving behind the culturally admired state of thinness. Many girls are distressed when they mature because they gain weight. Early maturers experience this weight gain at a time when most of their peers are still girlishly thin. One interesting study showed that in ballet companies—where thinness is even more important than in the culture at large—late maturers, who can retain the "ideal" shape much longer than earlier maturers, have fewer psychological problems than even on-time girls (Brooks-Gunn & Warren, 1985). In contrast, at puberty, boys move from a culturally undesirable state for males (short and scrawny) to a culturally admired one (tall and muscular). Early maturers enjoy the advantage of being tall and muscular before their peers—a special benefit in a society that values males' athletic prowess—and therefore are more likely to react well to puberty. The fact that the effects of early maturation on girls' self-esteem vary across cultures suggests that contextual factors need to be taken into account in explaining this pattern of sex differences.

Whatever the explanation, it's important for parents and school counselors to bear in mind that early-maturing girls are at heightened risk for psychological problems. Unfortunately, as long as our culture overvalues thinness and encourages the view that females should be judged on the basis of their physical appearance rather than their abilities, values, or personality, the risks of early puberty will probably endure. Adults can help by being supportive, by helping the early-maturing girl recognize her strengths and positive features—physical and nonphysical alike—and by preparing her for puberty before it takes place.

Like their male counterparts, early-maturing girls are also more likely to become involved in problem behavior, including delinquency, drinking, and drug use; to have school problems; and to experience early sexual intercourse (Boden, Fergusson, & Horwood, 2011; Negriff & Susman, 2011; Verhoef, van den Eijnden, Koning, & Vollebergh, 2014). This is true in Europe and the United States (Silbereisen et al., 1989) and across ethnic groups within the United States (Baams et al., 2015; Deardorff, Gonzales, Christopher, Roosa, & Millsap, 2005). These problems appear to arise because early-maturing girls, like early-maturing boys, are more likely to spend time unsupervised (Kretschmer et al., 2014), hanging out with older adolescents, especially older adolescent boys, who initiate them into activities that might otherwise be delayed (Negriff, Susman, & Trickett, 2011b; Savolainen et al., 2015); early-maturers whose parents are not very knowledgeable about their daughter's activities are especially likely to get into trouble (Marceau, Abar, & Jackson, 2015). This situation is worsened by the fact that, as early maturers start to get involved in more problem behavior, they start to lose their friends who aren't interested in these activities (Franken et al., 2016). Other explanations for the link between early maturation and girls' problem behavior have also been proposed: Some research suggests that the association may be partly due to common genetic influences (i.e., genes that influence both the timing of puberty and involvement in delinquency) (Harden & Mendle, 2012; Vaughan, Van Hulle, Beasley, Rodgers, & D'Onofrio, 2015). Another found that early maturation leads to early sexual activity, which in turn leads to delinquency (Negriff, Susman, & Trickett, 2011b).

Again, however, it is important to consider the role of context in interaction with pubertal change. Although early-maturing girls are more likely to engage in delinquent behavior than late maturers, this is true only for girls who attend coeducational high schools (Caspi, Lynam, Moffitt, & Silva, 1993). Early-maturing girls in all-female schools are no more likely than late maturers to be involved in delinquent activities, presumably because there are far fewer opportunities for delinquency in same-sex schools. Thus, while early puberty may predispose girls toward more frequent and earlier deviance, this predisposition may be realized only in an environment that permits the behavior—such as a school or out-of-school setting that places early-maturing girls in close contact with older boys (Stattin, Kerr, & Skoog, 2011). Similarly, among both boys and girls, the impact of early maturation on problem behavior or depression is accentuated when adolescents have many stressful life events, have harsh and inconsistent parents, or live in disadvantaged