ADOLESCENCE

THIRTEENTH EDITION

Mc Graw Hill

LAURENCE STEINBERG

Adolescence

Thirteenth Edition

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Laurence Steinberg

Temple University

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For Henry, at the beginning of life's journey.

About the Author

Laurence Steinberg

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 45 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 500 scholarly articles on growth and development during the teenage years, as well as the books *You and Your Adolescent: The Essential Guide for Ages 10-25*; *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 11 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

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Guide to Diversity, Equity, and Inclusion

The Thirteenth Edition of *Adolescence* has been fully revised and updated with topics related to diversity, equity, and inclusion in mind. In addition to the chapter-specific revisions, this edition has undergone global changes, including an updated photo program to enhance diversity and inclusion. This edition also includes new citations of studies and researchers who represent diverse and international samples and topics.

Introduction: The Study of Adolescent Development

- "Making the Cultural Connection" box asking students to consider ceremonies and informal events that signify the transition to adulthood
- Adolescence in developing countries, including anthropological perspectives of adolescence in developing and developed countries
- Stereotypes about adolescents and teenagers, including cross-cultural studies related to the connection between how adolescents behave and how they are perceived, including research by Qu et al. (2020).

Chapter 1: Biological Transitions

- Geographic and environmental factors that influence puberty
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- Pubertal maturation, including cross-cultural and familial trends and influences, citing research from Nagata et al. (2018)
- Sex changes resulting from prenatal hormone exposure, citing research from Sisk & Romeo (2019)
- Obesity and its prevalence in both industrialized and developing countries, citing research from Lewis-Smith et al. (2020), Neumark-Sztainer et al. (2006), and Jackson & Chen (2014)
- Eating disorders, including cross-cultural research and sociocultural factors, citing research from Bodell et al. (2018), Lee et al. (2013), and Olvera et al. (2015)

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- Subjective social status and its effects, citing Du, Chi & King (2019), Rahal et al. (2020), Rivenbark et al. (2019), Russell & Odgers (2020), and Raposa et al. (2019)
- Neighborhood conditions and their effects on adolescent development, including the effects of relocation on striving adolescents, citing Burnside & Gaylord-Harden (2019), Kan et al. (2020), Xiao, Romanelli, Vélez-Grau,

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- Ethnic differences and cross-cultural influences in parenting styles and practices, citing Anguiano (2018), De Los Reyes, Ohannessian, & Racz (2019), Hou et al. (2020), Qu, Pomerantz & Deng (2016), Luebbe, Tu, & Fredrick (2018), and Li et al. (2019)
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- School transitions and the challenges faced by boys, underrepresented ethnic students, and adolescents from disadvantaged families, citing Benner, Boykle, & Bakhtiari (2017), Kiuru et al. (2020), and Nelemans et al. (2018)
- The effects of school tracking on poor and underrepresented ethnic students due to discrimination
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- The effects of ethnic diversity and desegregation in schools and classrooms, including the role of stereotypes and private schools and the experiences of students from ethnic and socioeconomic groups, citing DuPont-Reyes & Villatoro (2019) among others
- The cross-cultural issues related to how an adolescent's ethnic and socioeconomic background influences teacher expectations and behavior, and, in turn, student engagement, citing Alm et al. (2019), Burns (2020), and Engels et al. (2020), Houston, Pearman, & McGee (2020)
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- Factors and effects related to the process of ethnic identity development in adolescents, including the benefits of strong ethnic identity and ethnic pride on mental health and academic achievement, citing Hughes, Del Toro, & Way (2017), Cross et al. (2018), Meca et al. (2019), and Spiegler, Wölfer, & Hewstone (2019)
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- Discrimination's negative effects on adolescents' physiology (e.g., poor sleep, inflammatory response), mental health (e.g., substance abuse, depression), behavior, and achievement, citing Bennett et al. (2020), Zapolski et al. (2020), Martin et al. (2019), and Yip et al. (2020)
- Updated discussion of research related to the specific effects of discrimination on Black teenagers, citing Seaton & Tyson (2019)
- Updated discussion of the complicated impact of having race as a central part of one's identity, which can make adolescents more sensitive to discrimination and also make them better able to cope with it, citing Seaton & Iida (2019), Meca et al. (2020), and Thomann & Suyemoto (2017)
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- Discussion of the prevalence of mental-health challenges among transgender adolescents, citing Paceley et al. (2020), Diamond (2020), and others
- The negative effects of stigmatization and discrimination within their communities, including excerpts from interviews with transgender youth living in a conservative, rural Midwestern community, including interview excerpts from Paceley et al. (2020)
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- Cross-cultural discussion of the parents' role in adolescent individuation and the effects of parental support of autonomy
- Ethnic and cultural differences in expectations for autonomy, including racial trends within different countries and how immigration affects perceptions of parents and their adolescents, citing Kiang & Bhattacharjee (2019), Nalipay, King, & Cai (2020), Tran & Rafaeli (2020), Yu et al. (2019), Cheah et al. (2019), and Rogers et al. (2020), among others
- Trends in peer influence related to sex, ethnicity, immigration background, and family structure
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- Examination of the origins of sex differences in intimacy, including the effects of social pressure, trends among some ethnic groups, and discrimination against gay teenagers, citing Savickaitė et al. (2019)
- Discussion of factors related to the "sex cleavage" and friendships across sexes, including the transition to mixed-sex friendships, curiosity about sexual feelings, and the advantages and disadvantages of platonic friendships, citing Savickaitė et al. (2019), among others
- Differences in the capacity for intimacy among boys and girls during adolescence, including addressing stereotypes about sex differences in romantic relationships
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- Factors and trends that lead to significant differences in how boys and girls interpret the meaning of sex, including expectations and social disapproval, including excerpts from interviews from Garceau & Ronis (2019) and a figure based on that research
- Discussion of the social and scientific history that has impacted LGBTQ individuals, with a focus on contemporary research that sexual orientation is primarily determined by hormonal and genetic factors, citing Stewart et al. (2019) and Zhang, Solazzo, & Gorman (2020).
- Updated data about the prevalence of gender fluidity and sexual orientation among adolescents and young people, including a new figure illustrating teen participation in both same-sex and other-sex activities, citing Li & Davis (2020), including a new figure based on their research

- Discussion of the importance of parental support when LGBTQ individuals come out, including coverage of peer harassment and discrimination, especially of younger teenagers, citing Hequembourg, Livingston, & Wang (2020), Kaufman, Baams, & Veenstra (2020), and others
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- Updated discussion of the harassment of LGBTQ adolescents, the negative consequences of discrimination and hostility, the increased rates of depression and suicide among LGBTQ youth, and the importance of school- and community-based programs designed to promote tolerance and provide resources, citing la Roi et al. (2020), Ioverno & Russell (2020), Watson, Wheldon, & Puhl (2020), Eisenberg et al. (2020), Zhang et al. (2020), and Raifman et al, (2020), among others
- Risk factors related to adolescent rape and reasons why rape and sexual abuse are likely far more common that reported studies reveal
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- Discussion of how school environments and classroom atmosphere influence achievement, including how a lack resources negatively affects opportunity, especially for poor and underrepresented students
- Updated discussion of mixed results related to parental involvement in different ethnic households, including studies of Black, Latinx, Mexican American, Asian, and White students, citing Aceves, Bámaca-Colbert, & Robins (2020) and Day & Dotterer (2018), among others
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- Global data on U.S. proficiency scores in core subjects, which are mediocre in comparison with other industrialized countries, citing OECD (2020) data
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- Socioeconomic influences on occupational choice, including social class, status, and educational attainment as determinants of what people look for in jobs, citing Afia et al. (2019), Gubbels, van der Put, & Assink (2019), and Samuel & Burger (2020)

Chapter 13: Psychosocial Problems in Adolescence

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- The role of environment and social context as it influences adolescent substance use and abuse, including availability of drugs, community norms, drug-law enforcement, and mass media portrayal, citing Meisel & Colder (2020), Wesche, Kreager, & Lefkowitz (2019), Griesler et al. (2019), and Parra et al. (2020)
- Discussion of protective factors related to substance abuse and how they operate similarly across ethnic groups, citing Su et al. (2019), Quach et al. (2020), and others
- Discussion of successful substance-abuse treatments, which are not as available to underrepresented ethnic groups due to financial or insurance reasons
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- Trends in victimization and shootings by race and ethnicity, including those related to school shootings and inner-city communities, citing Wylie & Rufino (2018) and Yu et al. (2018)
- Trends related to underreporting and selective reporting of rates of juvenile offending, including higher reporting levels among poor and underrepresented adolescents and racial bias and stereotypes that are most likely to impact Black individuals and influence the processing of minor crimes, citing data from the Federal Bureau of Investigation (2020), the Office of Juvenile Justice and Delinquency Prevention (2020), and the National Center for Juvenile Justice (2020)
- Discussion of the fact that ethnic differences in the prevalence of self-reported offending are smaller than those in official records, citing Singer (2017)
- Gender roles as a driver of sex differences in depression, including correlated pressures on young women to behave in sex-stereotyped ways, a tendency to respond to stress by turning feelings inward, and greater orientation toward interpersonal relations, citing Kwong et al. (2019), LeMoult et al. (2019), and Owens et al. (2019)
- Ethnic and sex differences in attempted suicide and sex differences in non-suicidal self-injury, citing Centers for Disease Control and Prevention (2020) data and research from Zhu, Chen, & Su (2020), Hamza & Willoughby (2019), and Schwartz-Mette & Lawrence (2019)
- Cross-cultural similarities in the connection between stress and psychosocial problems

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 nearly 50 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.

Paired with McGraw Hill **Connect™**, a digital assignment and assessment platform that strengthens the link between faculty, students, and course work, instructors and students accomplish more in less time and improve their performance.

Apply Concepts and Theories in an Experiential Learning Environment

An engaging and innovative learning game, **Quest: Journey Through the Lifespan®** provides students with opportunities to apply content from their human development curriculum to real-life scenarios. Students play unique characters who range in age and make decisions that apply key concepts and theories for each age as they negotiate events in an array of authentic environments. Additionally, as students analyze real-world behaviors and contexts, they are exposed to different cultures and intersecting biological, cognitive, and socioemotional processes. Each quest has layered replayability, allowing students to make new choices each time they play—or offering different students in the same class different experiences. Fresh possibilities and outcomes shine light on the complexity of and variations in real human development. This experiential learning game includes follow-up questions, assignable in Connect and auto-graded, to reach a high level of critical thinking.

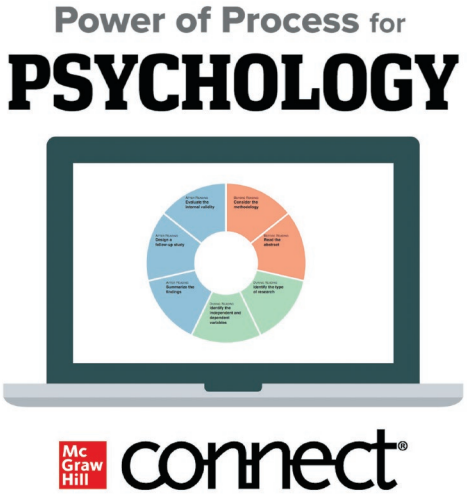
A Personalized Experience that Leads to Improved Learning and Results

SMARTBOOK®

How many students think they know everything about adolescent psychology but struggle on the first exam? Students study more effectively with Connect and SmartBook.

- Connect's assignments help students contextualize what they've learned through application, so they can better understand the material and think critically.
- Connect reports deliver information regarding performance, study behavior, and effort so instructors can quickly identify students who are having issues or focus on material that the class hasn't mastered.
- SmartBook helps students study more efficiently by highlighting what to focus on in the chapter, asking review questions, and directing them to resources until they understand.
- SmartBook creates a personalized study path customized to individual student needs.

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.

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.

Writing Assignment

New to this edition and found in Connect, Writing Assignments offer faculty the ability to assign a full range of writing projects to students with just-in-time feedback.

You may set up manually scored assignments in a way that students can:

- automatically receive grammar and high-level feedback to improve their writing before they submit a project to you;
- run originality checks and receive feedback on "exact matches" and "possibly altered text" that includes guidance about how to properly paraphrase, quote, and cite sources to improve the academic integrity of their writing before they submit their work to you.

The new Writing Assignments will also have features that allow you to assign milestone drafts (optional), easily re-use your text and audio comments, build/score with your rubric, and view your own originality report of student's final submission.

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. New to this edition, Milestones are available in a more engaging, WCAG-compliant format. Ask your McGraw Hill representative about this new upgrade.

Inform and Engage on Psychological Concepts

Located in Connect, **NewsFlash** is a multimedia assignment tool that ties current news stories, TedTalks, blogs, and podcasts to key psychological principles and learning objectives. Students interact with relevant news stories and are assessed on their ability to connect the content to the research findings and course material. NewsFlash is updated twice a year and uses expert sources to cover a wide range of topics including: emotion, personality, stress, drugs, COVID-19, disability, social justice, stigma, bias, inclusion, gender, LGBTQIA+, and many more.

Chapter-by-Chapter Changes

The thirteenth edition of *Adolescence* features updated and expanded coverage of key issues in development in every chapter. This revision is reflected primarily in Chapters 3, 4, 8, and 12.

Below is a complete list of changes in each chapter:

Chapter 1

- Thorough update of all content (more than 70 new citations)
- Four new figures in total
- Added discussion of changes in brain physiology during adolescence
- Refocused discussion of adrenarche
- Updated discussion of the timing of puberty and additions related to the concept of "precocious" puberty
- Updated discussion of genetic and environmental influences on pubertal timing
- New subsection on the connection between puberty and stress
- New "Making the Scientific Connection" box about the complicated relationship between puberty, psychological functioning, and other significant events.
- Expanded discussion on sleep patterns and the related effects of academic and extracurricular demands
- New figure about the correlation between early-maturing boys and delinquent behavior
- Revised section on obesity, including two new figures and consideration of the potential related effects of COVID-19 on adolescent activity levels

Chapter 2

- Thorough update of all content (more than 60 new citations)
- Five new figures in total
- Refined discussion of adolescent reasoning abilities and metacognition
- Two new figures illustrate patterns of neural connectivity, white matter, and gray matter
- New figure illustrates the brain regions responsible for social cognition, cognitive control, and reward processing
- New figure illustrates the maturity gap
- Updated discussion of IQ and intelligence tests.
- Added discussion of social conventions and laws in the context of the COVID-19 pandemic
- Updated discussion of adolescent risk taking, including a new figure and descriptions of recent research

Chapter 3

- Thorough update of all content (more than 80 new citations)
- Four new figures and two new tables in total
- Updated discussion about the elongation of adolescence
- New discussion and figure about perceptions in the importance of traditional markers of adulthood
- Expanded discussion of the concept of "emerging adulthood," including the factors and experiences that are related to it
- Revised discussion of social redefinition of adolescents in contemporary society
- Updated data on number of young adults living at home and leaving home during the COVID-19 pandemic, including a new figure
- Updated discussion of transitional problems of poor, minority, and immigrant youth
- Updated discussion of the effects of chronic stress, poverty, and income inequality on adolescents, including a new figure
- Updated discussion of the impact of mentoring programs
- Fully revised discussion of the impact of poverty on adolescent development, including a new figure
- New discussion and table showing the effects of violence and stress on behavioral, emotional, and physical health

Chapter 4

- Thorough update of all content (more than 100 new citations)
- Four new figures in total

- Expanded discussion of changing family relationships during adolescence
- New figure showing what parents are likely to lie to their children about
- Updated discussion about relationships between parents and adolescents in immigrant families
- New figure illustrating the differences in adolescent relationships with their mothers versus fathers
- New figure showing the correlation between an adolescent's impulsivity and aggression in rejecting parenting
- Updated and refined discussion of attachment, parenting style, and adolescent autonomy
- Updated discussion of household composition based on 2020 census data
- Updated discussion of the effects of stress and poverty, including the economic downturn related to the COVID-19 pandemic
- Updated data related to homelessness among the LGBTQ, Black, and Latinx adolescents

Chapter 5

- Thorough update of all content (more than 80 new citations)
- Four new figures in total
- Population trend data updated to reflect the 2020 census
- Updated "Making the Cultural Connection" box about values in different parts of the world
- New figure showing correlation between popularity and peer satisfaction
- New discussion of victimization and depression
- Updated discussion of bullying and victimization, including a new figure showing global trends in adolescent suicide
- New figure showing the different ways adolescents deal with cyberbullying

Chapter 6

- Thorough update of all content (more than 30 new citations)
- Four new and two revised figures in total
- Population trend data updated to reflect the 2020 census
- Updated "Making the Cultural Connection" box about values in different parts of the world
- New content about the impact of remote schooling during the COVID-19 pandemic
- New content about the effects of the shift in focus to standardized testing in schools
- Updated data about the achievement gap among students of different ethnic backgrounds
- New content about school inequality and school size
- Updated content about ADHD, including a figure illustrating gender differences in diagnoses
- Updated research about the connection between school diversity on mental health
- Updated research about school climate, cognitive performance, and striving students, including a new figure
- New figure about school discipline and student trust and engagement
- Updated content about the prevalence of the bullying of LGBTQ teenagers
- New figure illustrating the prevalence of boredom in school

Chapter 7

- Thorough update of all content (more than 80 new citations)
- Five new figures in total
- Updated content about adolescent free time
- New "Making the Cultural Connection" box about student employment
- New figure about participation in extracurricular activities
- Updated discussion of media saturation and sources
- New figure about the topics teenagers text about
- Updated discussion of media exposure
- New figure illustrating the connection between screen time and adolescent depression
- Updated data on the impact of violent video games and adolescent aggression
- Updated discussion of social media's impact and use among adolescents
- Revised subsection on Internet addiction

- New figure about sexting among contemporary teenagers
- New figure about victimization on social media

Chapter 8

- Thorough update of all content (more than 100 new citations)
- Four new figures in total
- Updated discussion of self-concept
- Expanded discussion of dimensions of personality in adolescence, including a new figure
- Updated discussion of self-esteem in adolescence
- Updated discussion of the social context of identity development
- Expanded discussion of ethnic identity, including a new figure and text on multiethnic adolescents
- Revised discussion of discrimination
- New discussion of gender identity, including a section on terminology and a new figure about gender identity and sexual orientation
- Expanded section on transgender adolescents
- Revised discussion of gender-role socialization, including a new figure

Chapter 9

- Thorough update of all content (more than 80 new citations)
- Six new figures in total
- Revised discussion of parenting and emotional autonomy, including a new figure
- Updated discussion of parental and peer influence, including a new figure
- New research on the role of peer influence on adolescent compliance with social-distancing guidelines during the COVID-19 pandemic, including a new figure
- Updated discussion of prosocial reasoning and behavior
- New figure about relationship between socioeconomic status and adolescent views of American society
- Expanded discussion of adolescent political thinking, including a new figure
- Expanded discussion of adolescent religious involvement, including two new figures

Chapter 10

- Thorough update of all content (more than 30 new citations)
- Three new and one revised figure in total
- Updated discussion of changes in the nature of friendship
- Updated discussion of loneliness in adolescence, including a new figure
- Updated discussion of targets of intimacy, low-income youth, and youth programs
- Revised discussion of the role of context in intimacy
- Updated discussion of LGBTQ intimate relationships, including a new figure
- Updated discussion of violence in romantic relationships, including a new figure

Chapter 11

- Thorough update of all content (more than 60 new citations)
- Four new and two revised figures in total
- Updated data related to sexual intercourse, based on 2020 CDC research
- Revised discussion of changes in sexual activity over time, using updated CDC data as a foundation
- Updated discussion of the relationship between sex and drugs
- Revised discussion of parent-adolescent communication
- Expanded discussion of the influence of peers on sexual activity
- Updated discussion of the meaning of sex, including a new figure
- Expanded and heavily revised discussion of same-sex attraction, including a new figure
- Updated discussion of the harassment of sexual minority youth
- Updated discussion of AIDS and other sexually transmitted diseases
- Updated discussion of teenage pregnancy and abortion, including two new figures
- Expanded and updated discussion of teenage pregnancy and motherhood

Chapter 12

- Thorough update of all content (more than 30 new citations)
- One new and two new revised figures and one new table in total
- Updated discussion of fear of failure and the Yerkes-Dodson law, including a new figure
- Revised discussion of stereotype threat
- Updated discussion of the transition to high school
- Updated discussion of environmental influences on achievement
- Updated discussion of socioeconomic status on educational achievement
- Revised and updated discussion of ethnicity and achievement
- Updated discussion in educational achievement changes and discrepancies, including across races and ethnicities
- Updated discussion of the correlates of dropping out of high school

Chapter 13

- Thorough update of all content (more than 90 new citations)
- Six new figures in total
- Updated discussion of substance abuse and a new figure
- Updated discussion of ethnic trends and risk factors of drug use
- Updated data related to crime rates and juvenile offenders, including a new figure
- Revised and updated discussion of changes in juvenile offending over time, including trends in gender differences
- Updated discussion of antisocial adolescents
- Revised and expanded discussion of internalizing problems, including a new figure
- New figure illustrating rates of depression among American adolescents
- New figure illustrating sex differences in rates of depression that emerges in adolescence and disappears in early adulthood
- Updated discussion of risk factors for suicide, including a new figure illustrating the connection between suicide and the menstrual cycle
- Updated discussion about suicide contagion

Online Instructor Resources

The resources listed here accompany the Thirteenth Edition of *Adolescence.* 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 Test Builder Organized by chapter, the questions are designed to test factual, conceptual, and applied understanding; all test questions are available within Test Builder. Available within Connect, Test Builder is a cloud-based tool that enables instructors to format tests that can be printed, administered within a learning management system, or exported as a Word document of the test bank. Test Builder offers a modern, streamlined interface for easy content configuration that matches course needs, without requiring a download.

Test Builder allows you to:

- access all test bank content from a particular title.
- easily pinpoint the most relevant content through robust filtering options.
- manipulate the order of questions or scramble questions and/or answers.
- pin questions to a specific location within a test.
- determine your preferred treatment of algorithmic questions.
- choose the layout and spacing.
- add instructions and configure default settings.

Test Builder provides a secure interface for better protection of content and allows for just-in-time updates to flow directly into assessments.

PowerPoint Presentations The PowerPoint presentations, available in both dynamic, lecture-ready and accessible, WCAG-compliant versions, highlight the key points of the chapter and include supporting visuals. All of the slides can be modified to meet individual needs.

Remote Proctoring and Browser-Locking Capabilities Remote proctoring and browser-locking capabilities, hosted by Proctorio within Connect, provide control of the assessment environment by enabling security options and verifying the identity of the student. Seamlessly integrated within Connect, these services allow instructors to control students' assessment experience by restricting browser activity, recording students' activity, and verifying students are doing their own work. Instant and detailed reporting gives instructors an at-a-glance view of potential academic integrity concerns, thereby avoiding personal bias and supporting evidence-based claims.

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. I'm especially grateful to Colleen Brown and Emily Kan for their assistance in identifying new research that informed this revision.

The following instructors provided invaluable guidance for the Thirteenth Edition of *Adolescence*:

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The Study of Adolescent Development

INTRODUCTION

The Boundaries of Adolescence
- Early, Middle, and Late Adolescence

A Framework for Studying Adolescent Development
- The Fundamental Changes of Adolescence
- The Contexts of Adolescence
- Psychosocial Development of Adolescence

Theoretical Perspectives on Adolescence
- Biosocial Theories
- Organismic Theories
- Learning Theories
- Sociological Theories
- Historical and Anthropological Perspectives

Stereotypes Versus Scientific Study

Troy Aossey/Getty Images

During the early months of 2020, the rapid and frightening spread of the virus that causes COVID-19 created one of the most serious public health and economic crises the world has ever seen. One of the most difficult challenges faced by countries with a high incidence of infection, such as the United States, was how to safely provide education to millions of elementary, secondary, and college students. Experts worried about the spread of the virus not only among students but also between students and others with whom they come into contact—teachers, parents, and other adults in the community.

As an expert on adolescent development, I was asked frequently about the potential impact of the pandemic on adolescents. There were so many issues to contemplate: whether it was safe to return to school, whether students could learn just as effectively through remote instruction as in in-person classes, whether college undergraduates who returned to campus were capable of adhering to their schools' guidelines for safe behavior, whether the increased use of social media was likely to hurt teenagers' social development, and, of course, how to help adolescents protect their mental health during this difficult time.

Fortunately, today's scientists can do much more than make educated guesses. Over the past three decades, there's been enormous growth in the science of adolescence, so when experts are asked these sorts of questions, we have plenty of research to draw on—research on adolescent decision making, on the impact of social media on teenagers' psychological development, on instructional technology, on factors that make some young people more vulnerable to depression than others.

Research on adolescent risk taking has been especially relevant to discussions about whether it was safe for campuses to reopen. Personally, I was pessimistic about many of the plans colleges and universities had proposed. In an op-ed I published in *The New York Times*, I wrote that students might be able to comply with social distancing guidelines for awhile, but not for more than two weeks or so, and that once they started socializing with each other, the virus would spread rapidly (Steinberg, 2020).

In the early months of the COVID-19 pandemic, many college undergraduates ignored public health experts who cautioned against large group gatherings. Mike Stocker/Sun Sentinel/Tribune News Service/Getty Images

It turned out that my two-week estimate was overly optimistic. As soon as colleges reopened, students started partying. Within one week of reopening, universities all over the country began reversing course, closing dorms, sending students home, resuming online instruction, and disrupting the plans of thousands of students. By late August, before very many students had returned to campus, there already were more than 25,000 confirmed cases of COVID-19 on college and university campuses across the United States. By late October, there were nearly 220,000 (New York Times, 2020).

No one familiar with research on adolescent risk taking would have been surprised by this. Dozens of studies have shown that risk taking is more common during the late teens and early 20s than at any other age, not just in the United States, but around the world (Duell et al., 2018). Had university administrators looked to the science of adolescence for guidance, they might have decided to do things differently.

The Boundaries of Adolescence

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

The word *adolescence* is derived from the Latin *adolescere,* which means "to grow into adulthood" (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. 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.

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 in which 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?

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. Determining the beginning and ending of adolescence is more a matter of opinion than of absolute fact.

We can think of development during adolescence as involving a *series* of transitions from immaturity into maturity (Howard & Galambos, 2011; 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.

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 ages 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, 2014a).

Early, Middle, and Late Adolescence

Today, 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

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	Attaining a separate sense of 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 the capacity for mature 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 to 13, corresponding roughly to the junior high or middle school years.

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

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

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

puberty
The biological changes of adolescence.

whose time and energy is wrapped up in hip-hop, TikTok, and basketball, for example, has little 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 to 13), **middle adolescence** (about ages 14 to 17), and **late adolescence** (about ages 18 to 21).

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 et al., 2005).

One 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; virtually without exception, all adolescents in every society go through them.

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

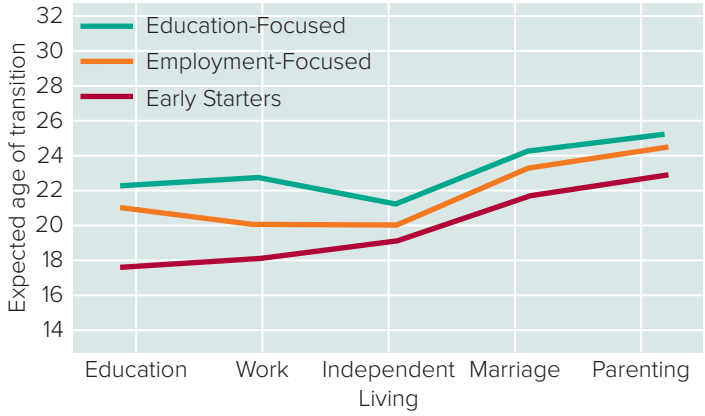

Figure I.1 **In one study of expectations for the future among rural high school juniors, three groups were found: "early starters," "employment focused," and "education focused."** (Beal, Crockett, & Peugh, 2016)

increase in height for both sexes) and the development of the ability to conceive children (Worthman, Dockray, & Marceau, 2019). 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 cognitive 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 (Spear & Silveri, 2016).

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

The implications of the cognitive changes of adolescence are far-reaching. Getty Images

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 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

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.

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, economics, and history.

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:

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

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.

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 et al., 2017), extracurricular activities (Farb & Matjasko, 2012), and the mass media (Brown & Bobkowski, 2011a), including social media, which have become increasingly important in teenagers' lives (Twenge et al., 2018). To what extent do these forces influence adolescents' attitudes, beliefs, and behavior?

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

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: 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.

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 et al., 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 (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

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.

Sexuality is a central psychosocial issue of adolescence. Maria Teijeiro/Getty Images

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

sexual is an important aspect of development at this age—not only because it transforms relationships 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 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 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. Infancy, in his view, was equivalent to the time during our evolution when we were more like animals than humans. Adolescence, in contrast, was seen as a transitional and turbulent time that paralleled the evolution of our species from primitive "savages" into civilized adults. 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 belief that the adolescence 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

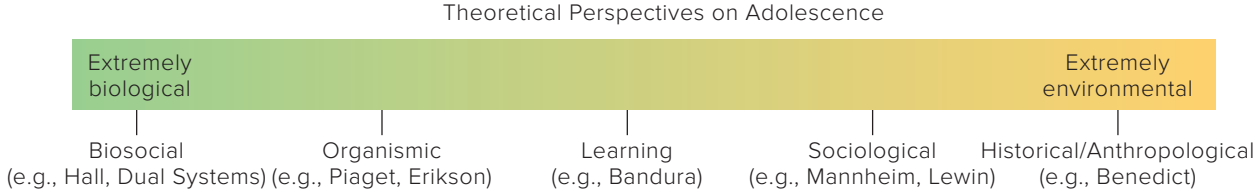

Figure I.2 **Theories of adolescence range from the extremely biological, such as that of G. Stanley Hall, to the extremely environmental, such as that of Ruth Benedict.**

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, 2019).

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, such as 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 create problems (Steinberg, 2014a).

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).

Freud 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 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 was best 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

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

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.

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, are **learning theories.** 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, such as 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 celebrities 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, adults often criticize Millennials (people born between 1982 and 2004) for being spoiled and lazy, and for taking too long to become adults. But many Millennials are taking longer to become adults simply because they face many more financial challenges than their parents' generation did. As the title of one 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.

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 adolescent development, it was not until the rise of compulsory education that we began treating young people 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.

One response to adolescents' feelings of marginalization is political protest. LeoPatrizi/Getty Images

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, 2014a).

Stereotypes of adolescents as troubling and troubled have important implications for how teenagers are treated by parents, teachers, and other adults. Parent–teenager relations, especially, 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 et al., 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). Teenagers themselves are affected by the stereotypes they hold about the period; middle school students who believe that adolescence is a time of irresponsibility actually engage in more risk taking in high school than their peers (Qu et al., 2018). One study of Chinese seventh-graders found that those who believed that adolescents were emotional and impulsive were more likely to develop problems in self-control 1 year later (Qu et al., 2020),

Fortunately, the tremendous growth of the scientific literature on adolescence over the past four 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, 2014a). 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.

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 weren't valid or that your recollections inaccurate. (In fact, studies show that we remember things that happen during adolescence more vividly than any other time [Steinberg, 2014a].) 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.

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1 Biological Transitions

PhotoAlto/Sandro Di Carlo Darsa/Getty Images

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.

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 (Worthman, Dockray, & Marceau, 2019). 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

Technically, puberty 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 (Worthman, Dockray, & Marceau, 2019).

Puberty has four 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.
4. Changes in the brain's anatomy and activity as a result of hormonal influences.

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.

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 (Dorn et al., 2019). 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** (Sisk & Romeo, 2019).

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 (Aylwin et al., 2019). 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 or different times of the day). By setting your room's heating 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).

Your HPG axis is set to maintain certain levels of androgens and estrogens. 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, 2019).

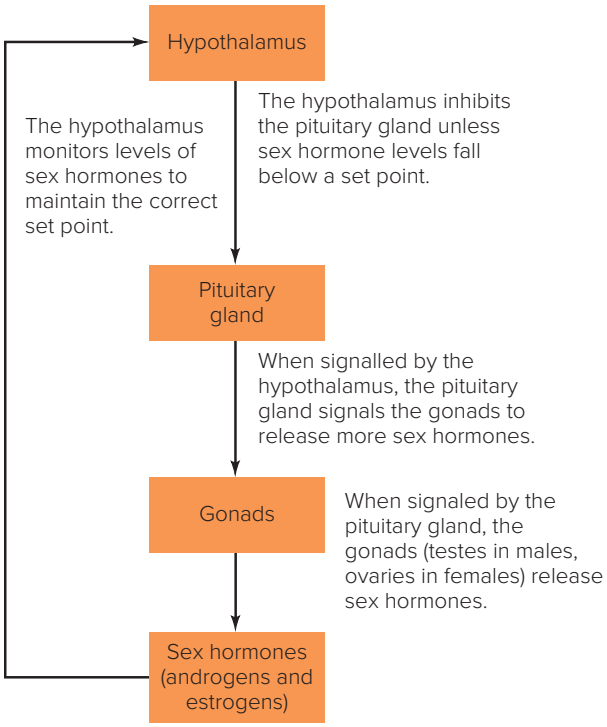

Figure 1.1 Levels of sex hormones are regulated by a feedback system (the HPG axis) composed of the hypothalamus, pituitary gland, and gonads. (Grumbach et al., 1974)

Adrenarche Do you remember the first time you felt sexually attracted to someone? Most people 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, which is a way of 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 (Kircanski et al., 2019; Lucas-Thompson, McKernan, & Henry, 2018). 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 et al., 2017; Monahan et al., 2016; Sisk & Romeo, 2019). 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). 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).

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.

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

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

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. During middle childhood, the HPG axis is reawakened and signals that the body is ready for puberty. Some of this is caused by an internal 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** (Aylwin et al., 2019) (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 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 whose levels rise and fall as a function of how light or dark it is, which helps regulate the sleep cycle (we'll discuss this later in this chapter). Our melatonin levels are lower when it is light and higher when it is dark.

Your genes predispose you to go through puberty around a particular age (Horvath, Knopik, & Marceau, 2020), 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 (Aylwin et al., 2019). 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 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.

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.

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

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, 2019). Generally, until about eight

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

weeks after conception, the human brain is "feminine" unless and until it is exposed to certain "masculinizing" hormones, such as 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, 2019). 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, our 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 6 months and 1 year, with smaller dogs maturing earlier than larger ones), still displayed stereotypical 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, 2019). 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 (Goddings et al., 2019; Icenogle et al., 2017).

Other changes during puberty are likely caused by an interaction between prenatal and pubertal hormones. Hormones that are present prenatally may organize a certain set of behaviors (e.g., 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 4 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.

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

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

Think for a moment of how quickly very young children grow. At the time when the adolescent is growing most rapidly, he or she is growing at the same rate as a toddler, about 4 inches (10.3 centimeters) per year for boys and about 3.5 inches (9.0 centimeters) per year for girls. 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).

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 also indicates that the growth spurt occurs, on average, about 2 years earlier among girls than boys. As you can see, boys tend to be somewhat taller than girls before age 11, girls tend to be taller than boys between ages 11 and 13, and 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 a gain 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.)

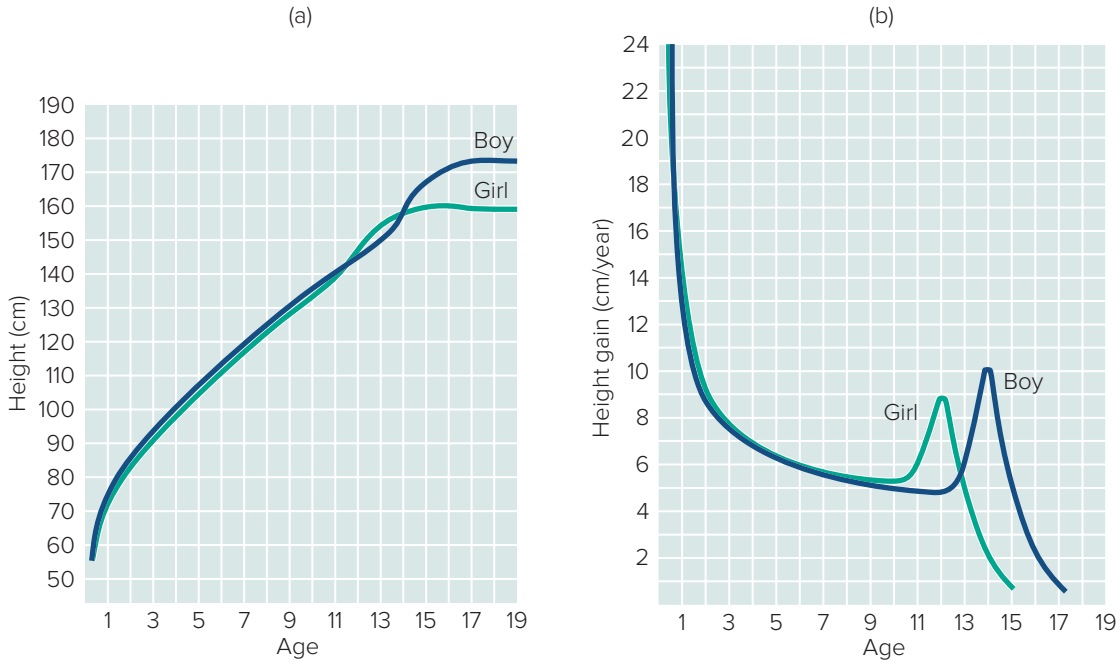

Figure 1.2 **(a) Height (in centimeters) at different ages for the average male and female youngster. (b) Gain in height per year (in centimeters) for the average male and female youngster. Note the adolescent growth spurt.** (Adapted from Marshall, 1978)

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).

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, 2014). 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 et al., 2014). 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, however (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 et al., 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).

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

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.

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

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

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 2 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 2 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).

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, boys' skin becomes rougher, especially around their 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 semen generally occurs about 1 year after the beginning of accelerated penis growth, although this is often determined culturally rather than biologically since for many boys, their first ejaculation occurs as a result of masturbation (J. Tanner, 1972). One interesting observation about the timing and

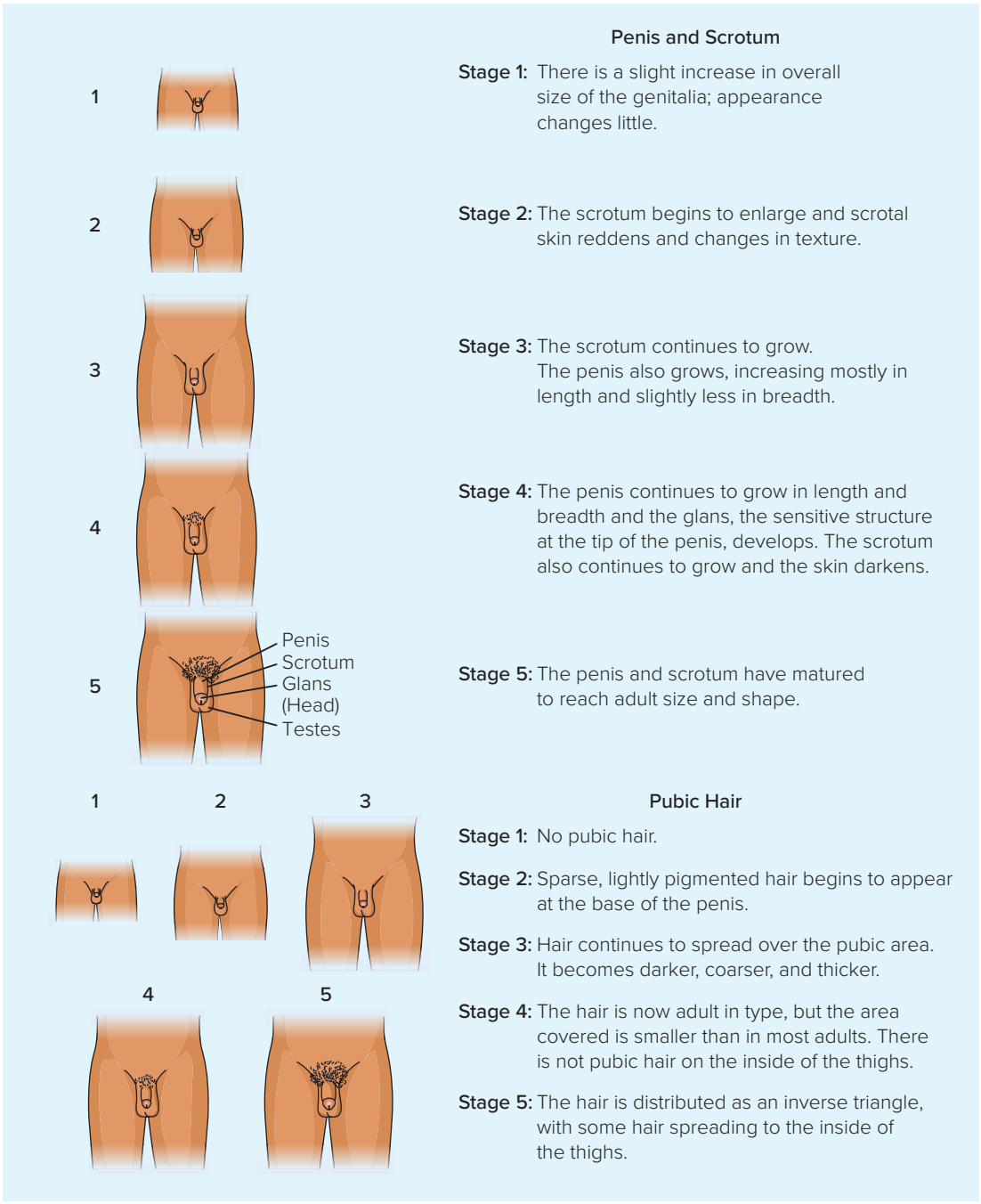

Figure 1.3 The five pubertal stages for penile and pubic hair growth. (From Morris & Udry, 1980)

sequence of pubertal changes in boys is that boys usually are 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.

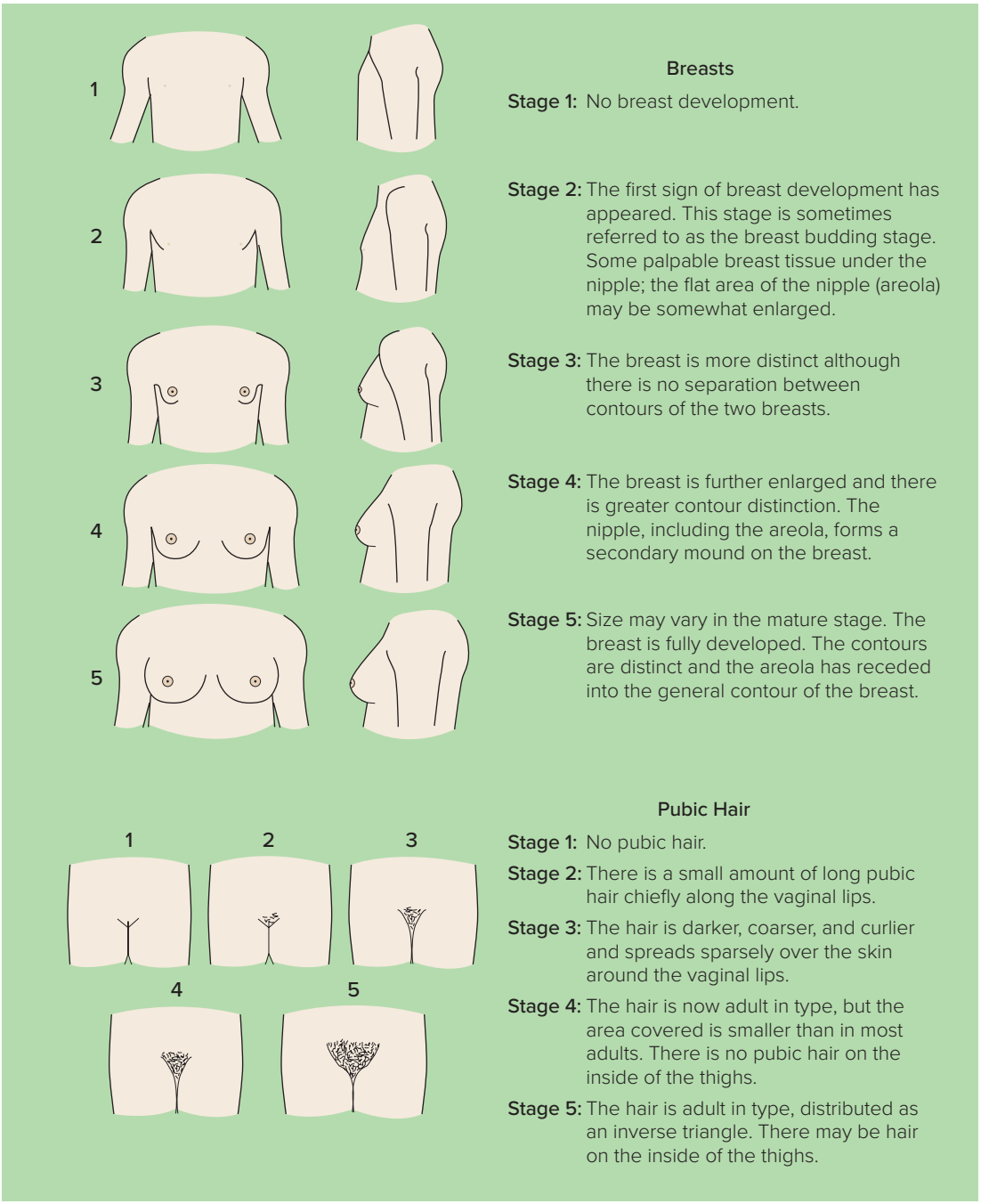

Figure 1.4 The five pubertal stages for breast and pubic hair growth. (From Marshall & Tanner, 1969)

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

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 2 years (Bogin, 2011). Unlike boys, girls typically appear physically mature before they are fertile.

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

Today, the typical onset of puberty in developed countries is between 8 and 13 in girls and between 9 and 14 in boys. (Children who begin puberty outside these age ranges are technically considered "precocious" or "delayed," although a substantial increase in recent years of girls who begin puberty before 8 is causing a reconsideration of what constitutes "precocious.") In girls, the interval between the first sign of puberty and 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!

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

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 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 Latinx girls, who, in turn, mature earlier than White girls (Chumlea et al., 2003; Herman-Giddens et al., 1997). Although the reasons for these ethnic differences are not known, they do not appear to be due to ethnic differences in income, weight, or area of residence (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 (Greenspan & Deardorff, 2014).

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 (Geet al., 2007).

Individual Differences in Pubertal Maturation The timing and tempo of pubertal maturation are largely inherited (Mustanski et al., 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 are 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.

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 et al., 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 (Joos et al., 2018); early puberty is also more common among girls who were sexually abused during childhood (Mendle, Ryan, & McKone, 2016; Negriff, Blankson, & Trickett, 2015). 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 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 et al., 2015; Saxbe et al., 2015), especially among girls who are genetically susceptible to this influence (Ellis et al., 2011; Hartman, Widaman, & Belsky, 2015). (Other types of stress, such as economic stress, hasten the onset of puberty, too; Sun et al., 2017.) 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.

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

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.

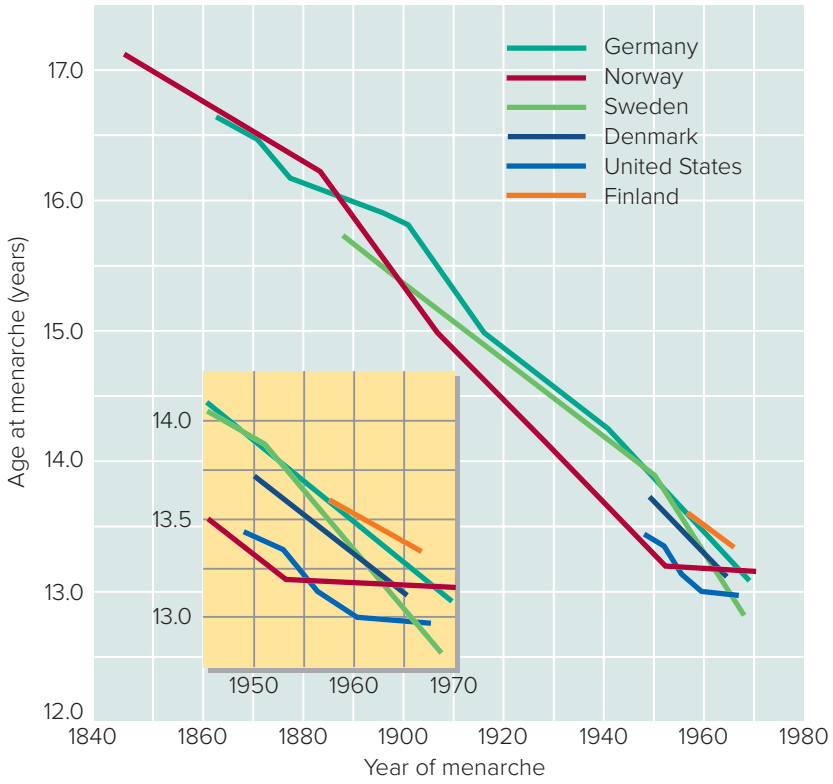

Figure 1.5 The age at menarche has declined considerably over the past 150 years. This decline is known as the secular trend. (Adapted from Eveleth & Tanner, 1990)

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 175 years ago, the average age of menarche may have been about 17 years. Today, it is between 12 and 13 years. A study of Danish adolescents found that five times the number of girls were diagnosed with clinically significant "precocious puberty" in 2017 than 20 years earlier (Brauner et al., 2020). 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 et al., 2017).

The secular trend is less well documented among boys, in part because there is no easily measured marker 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 human-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, 2014a). Brain systems that govern self-regulation are less influenced by puberty, so the secular trend has not greatly 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).

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. Mike Powell/Getty Images

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 (Lougheed, Hollenstein, & Lewis, 2016). First, the biological changes of puberty can have a direct effect on behavior through its impact on the structure and functioning of the brain (Boivin et al., 2018). For example, increases in levels of sex hormones at puberty heighten activity in brain regions that control our experience of reward, our basic emotions, and our reactions to social stimuli, such as how we interpret our interactions with and the behavior of others (Goddings et al., 2019).

Second, the biological changes of puberty may change the adolescent's self-image, which, in turn, may affect how he or she behaves (Kwon & Park, 2018). 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. One recent international study found that puberty leads parents to become less warm and less strict (Lansford et al., 2021). These changes in reactions may also provoke changes in the adolescent's peer relationships. 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.

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.

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.

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.

Is Puberty Stressful? The connection between puberty and stress is complicated. Although it had long been thought that puberty is a stressful experience, it

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

looks like stress is more likely to be a cause, rather than a consequence, of pubertal maturation. There is evidence that a modest, but not overwhelming, amount of stress early in life speeds the onset of puberty (Belsky, 2019). Some theorists have proposed that going through puberty at a younger age is an evolved adaptation to chronic early adversity. Being raised under stressful conditions creates uncertainty about the future and actually may stimulate the body to mature faster in order to be able to have children sooner, rather than later.

Whether going through puberty *creates* stress is a different matter. Here, the research indicates that the timing of puberty is key: Maturing early may be stressful, especially for girls, but going through puberty "on time" is generally not; research on whether late maturation is stressful is inconclusive (Joos et al., 2018). As you will read, girls who mature early are more likely to develop emotional and behavioral problems, such as depression and delinquency. It is not clear, however, if the higher incidence of problems among early-maturing girls is actually caused by early maturation or, instead, by the stress that led to early puberty; the problematic outcomes associated with early maturation are also associated with exposure to stress, independent of pubertal timing.

An additional complicating factor is that, as noted earlier in this chapter, puberty affects the brain in ways that make people more *vulnerable* to stress (Dorn et al., 2019). As a consequence, the same stressors have a more adverse impact on mental health when they occur in adolescence than when they occur in childhood or adulthood (Andersen, 2021). Not surprisingly, a wide range of mental health problems, including mood disorders, substance abuse, and eating disorders, are more likely to have their onset during adolescence than at any other time (Paus, Keshavan, & Giedd, 2008).

plasticity
The capacity of the brain to change in response to experience.

Heightened susceptibility to stress in adolescence is a specific example of the fact that puberty makes the brain more malleable, or "plastic" (Goddings et al., 2019). This makes adolescence both a time of risk (because the brain's **plasticity** increases the chances that exposure to a stressful experience will cause harm) but also a window of opportunity for advancing adolescents' health and well-being (because the same brain plasticity makes adolescence a time when interventions to improve mental health may be more effective).

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

Averages can be deceiving, however. Research that has monitored changes in adolescents' daily emotions by having them keep diaries about their activities and feelings has found that the majority of teenagers do not report large ups and downs in their moods. Moreover, teenagers become less moody as they get older (Maciejewski et al., 2015), although those who do not follow this trajectory are more likely to report psychological problems (Maciejewski et al., 2019).

Many people assume that adolescent moodiness is directly related to the hormonal changes of puberty. However, according to several comprehensive reviews of research on hormones and adolescent mood and behavior, the direct connection between hormones and mood is weak (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. 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 higher levels, later in puberty, their negative effects wane (Buchanan, Eccles, & Becker, 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