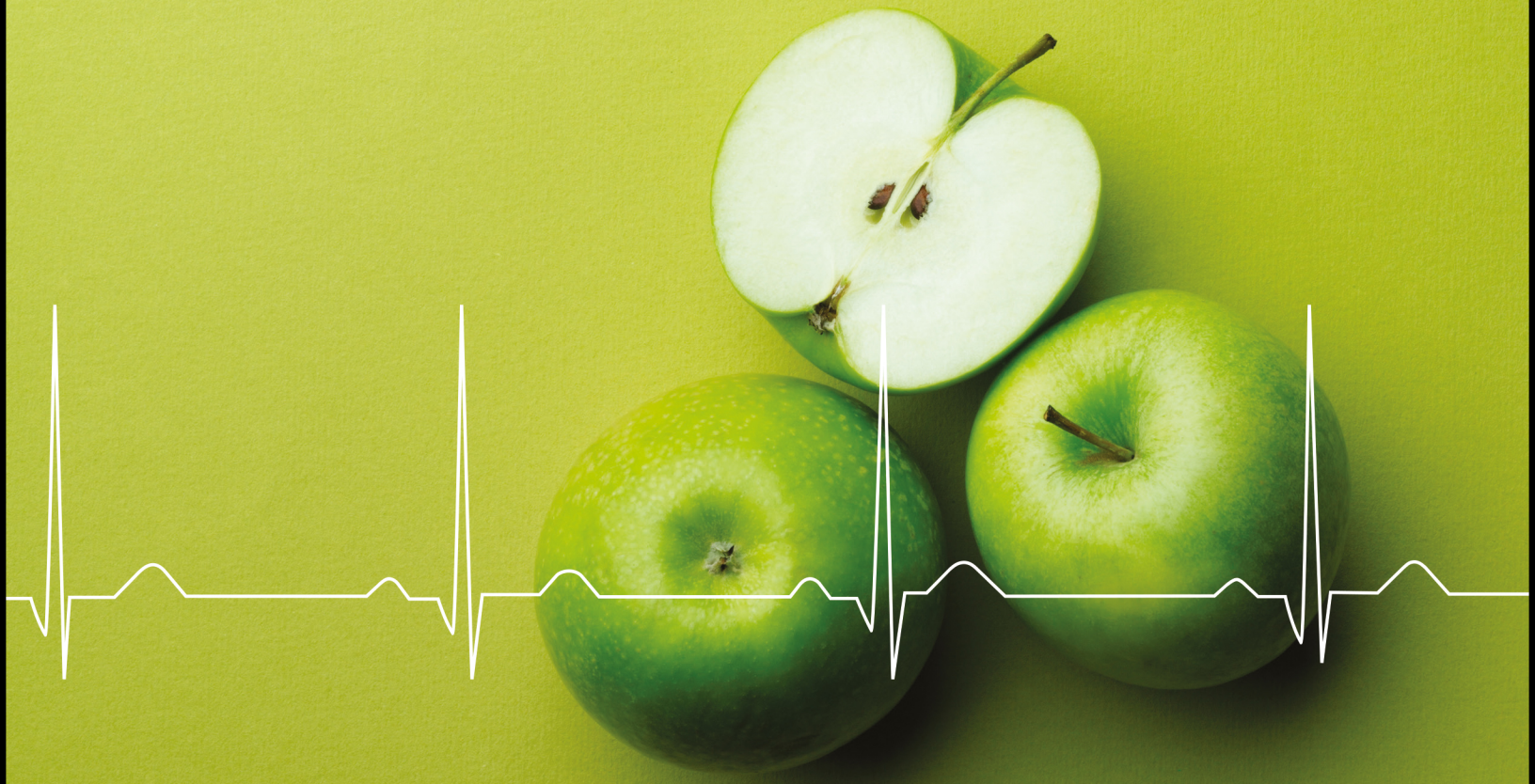
Edward P. Sarafino • Timothy W. Smith

HEALTH PSYCHOLOGY

Biopsychosocial Interactions

Ninth Edition



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The College of New Jersey

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E.P.S. In memory of my mother and father. They gave me life, loved and nurtured me, and helped me be healthy.

T.W.S. For Paula, Wyatt, and Elliott.

ABOUT THE AUTHORS

Edward P. Sarafino received his PhD from the University of Colorado and began his affiliation with the Department of Psychology at The College of New Jersey more than three decades ago. He is now Professor Emeritus there. His scholarship has combined areas of health, developmental, and behavioral psychology, particularly with regard to the study of asthma. In addition to having published dozens of research articles and chapters, he is the author of eight books. He is a Fellow of Division 38 (Health Psychology) of the American Psychological Association, served as an officer (Secretary) of that division, and has been a member of several committees of Division 38 and of the Society of Behavioral Medicine. When he is not working, he enjoys being with family and friends, traveling, hiking and other outdoor activities, and going to cultural events, especially music and visual arts.

Timothy W. Smith received his PhD from the University of Kansas. After both a pre-doctoral internship in clinical psychology and a post-doctoral fellowship in behavioral medicine at the Brown University Medical School, he joined the faculty of the Department of Psychology at the University of Utah, where he has remained for nearly thirty years. He has published over two hundred articles and chapters, and three books, most in personality and social psychology, clinical psychology, and health psychology and behavioral medicine, particularly in the area of psychosocial issues in cardiovascular disease. He is a Fellow in Division 38 (Health Psychology) of the American Psychological Association and in the Society of Behavioral Medicine. He has served as President of Division 38, and the Academy of Behavioral Medicine Research. He has also served as a member of the Behavioral Medicine Study Section of the National Institutes of Health, and as an Associate Editor or on the editorial boards of a variety of journals, including the *Journal of Consulting and Clinical Psychology*, *Health Psychology*, *Annals of Behavioral Medicine*, and the *American Psychologist*. His research has been supported by the National Institute on Aging and the National Heart, Lung, and Blood Institute of NIH, and has been recognized in awards from Division 38, the American Psychosomatic Society, and the Society of Behavioral Medicine. He has supervised the graduate studies of over twenty-five PhD students in clinical and health psychology, including two past recipients of the American Psychological Association's award for early career contributions to health psychology. He enjoys skiing, backpacking, mountain biking, exercise, and spending time with family and friends.

TO CONTACT THE AUTHORS

We would be pleased to receive comments and suggestions about this book from students and instructors so that we may consider those ideas for future editions. You may contact us at sarafino@tcnj.edu.

PREFACE

"The first wealth is health," wrote the poet/philosopher Ralph Waldo Emerson in the 19th century. Although people have probably always valued good health, they are becoming increasingly health conscious. This heightened consciousness generally reflects two beliefs: that we can do things to protect our health and that being sick is unpleasant. As Emerson put it, "Sickness is poor-spirited, and cannot serve anyone." Serious health problems can be quite distressing to a patient and his or her family and friends. These beliefs underlie psychologists' interests in helping people behave in ways that promote wellness, adjust to health problems that develop, and participate effectively in treatment and rehabilitation programs.

The goal for each edition of this text has been to create a teaching instrument that draws from the research and theory of many disciplines to describe how psychology and health are interconnected. The resulting book is a comprehensive text that is appropriate for several courses, especially those entitled either Health Psychology or Behavioral Medicine. Two objectives were central regarding the likely audience in these courses. First, although we aimed to make the content appropriate for upper-division students, we wrote in a straightforward style to make the material accessible to most sophomores. The content assumes that the student has already completed an introductory psychology course. Second, we tried to make the material relevant and interesting to students from diverse disciplines—particularly psychology, of course, but also fields such as sociology, medicine, allied health, and health and physical education. Training in health psychology has developed rapidly and can play an important role in helping students from many disciplines understand the interplay of biological, psychological, and social factors in people's health.

The field of health psychology is enormously exciting, partly because of its relevance to the lives of those who study it and individuals the students know or will work with in the future. The field is also exciting because it is so new, and researchers from many different disciplines are finding fascinating and important relationships between psychology and health every day. Keeping up to date in each area of such a complex field presents quite a challenge, which begins with culling from thousands of new abstracts, articles, and books to prepare for the current revision. Most of the more than 3,000 references this edition cites were published within the last 10 years, and hundreds are new, published since the prior edition of this book went to press.

NEW TO THIS EDITION

The new edition retains the overall organization and the pedagogy that students and instructors have praised in the last edition. It also retains the *modular* structure of Chapter 2, The Body's Physical Systems, which allows instructors to *choose* to cover *all of the systems at once* (assign the whole chapter) or *distribute* them to other chapters. For students using the distributed approach, appropriate subsequent chapters have salient notices that tell students when to read a specific module that is relevant to the current material. For example, a notice to read Module 4 (The Respiratory System) appears early in Chapter 7 at the start of the discussion of smoking tobacco, and a notice with the Key Terms list for that chapter reminds the students to study Module 4. In addition, we have retained the *interactive animations* of physiological systems in the Student Companion Website and notes in the book that prompt students to use them. Each animation takes 5 to 10 minutes to review and is accessed at http://www.wiley.com/college/sarafino.

Two features of the book were enhanced across chapters in the new edition. The most obvious enhancements are to:

- *Cross-cultural data*. To give students a broader picture of health psychology, we have found the latest available data on health and lifestyles and presented them concisely, typically in tables, for 14 countries: Australia, Brazil, Canada, China, Germany, India, Italy, the Netherlands, Singapore, South Africa, Sweden, Turkey, the United Kingdom, and the United States. For example, Table 6.7 gives data on infant mortality and preterm births in these countries. Two factors guided the choice of nations. First, we wanted to include countries with large and small populations that represent a variety of geographical areas and diverse cultures. Second, a very large number of students use this book outside the United States, and we wanted to include data for their nations, when available, to make the book more relevant for them.
- *Illustrations*. We updated data in several figures and developed new ones to clarify physiological processes and to present interesting

and important data. Figures 1-2, 6-4, 7-1, 9-2, 13-3, 14-3, 14-4, and 15-1 are examples.

Every chapter has been updated, and we substantially revised or expanded the coverage of the following topics:

- How stress affects health
- Health risks from adverse childhood experiences
- Religiosity, positive emotions, and health
- Stages of change and motivational interviewing in health promotion
- Processes in and prevention and treatment of tobacco and alcohol use
- Weight control and exercise
- Health care systems in the United States and around the world
- Pain conditions and treatment
- Chronic illnesses, treatments, and psychosocial interventions
- Technological approaches for health promotion

THEMES

A commonly stated goal in psychology is to understand the "whole person." To approach this goal, this book adopts the *biopsychosocial model* as the basic explanatory theme. We have tried to convey a sense that the components of this model interrelate in a dynamic and continuous fashion, consistent with the concept of *systems*. The psychological research cited reflects an eclectic orientation and supports a variety of behavioral, physiological, cognitive, and social–personality viewpoints. In addition, *gender and sociocultural differences* in health and related behaviors are addressed at many points in the book. In these ways, this book presents a balanced view of health psychology that is squarely in the mainstream of current thinking in the field.

One additional theme makes this book unique. We have integrated a focus on *life-span development* in health and illness throughout the book, and each chapter contains information dealing with development. For example, the book discusses how health and health-related behavior change with age and describes health care issues and examples that pertain to pediatric and elderly patients. Sometimes this information is organized as a separate unit, as with the sections "Development and Health-Related Behavior," "When the Hospitalized Patient Is a Child," "Assessing Pain in Children," and "Alzheimer's Disease."

ORGANIZATION

This text examines the major topics and problem areas in health psychology by using an overall organization that progresses in main focus across chapters from *primary*, to *secondary*, to *tertiary* prevention and care. As the table of contents shows, the book is divided into 15 chapters in the following seven parts:

- **Part I.** Chapter 1 presents the history and focus of health psychology and introduces the major concepts and research methods used in the field. Chapter 2 describes the physical systems of the body in an engaging manner a reviewer called "a pleasant surprise." This chapter is divided into six modules that instructors can assign in two ways—all together or distributed to later chapters—depending on how they like to organize the course. Instructors who cover the modules all together want to present the body systems as an integrated and basic topic that underlies all later topics. They also want students to have a single place to refer to if needed, such as when reading about the neural transmission of pain signals in Chapter 11. Instructors who distribute the modules want to introduce important physiological principles as they become relevant. Either approach works well.
- **Part II.** Chapters 3, 4, and 5 discuss stress, its relation to illness, and methods for coping with and reducing it. Some modules on body systems in Chapter 2 connect directly to discussions in Chapters 3 and 4, such as the sections entitled "Biological Aspects of Stress," "Physiological Arousal," "Stress, Physiology, and Illness," and "Psychoneuroimmunology." This connection is one reason why stress is covered early in the book. A reviewer recognized a second reason and wrote: "The issue of stress permeates all of the other topics, and it would be useful to have the students read about this first." Chapter 5 includes information on psychosocial methods in helping people cope better.
- **Part III.** The third part of the book examines issues involved in enhancing health and preventing illness. Chapters 6, 7, and 8 discuss how health-related behaviors develop and are maintained, can affect health, and can be changed via psychosocial and public health efforts. Chapter 7 gives special attention to the topics of tobacco, alcohol, and drug use, and Chapter 8 discusses nutrition, weight control, exercise, and safety. The role of stress in health behaviors and decision making is considered in these chapters. The book up to this point focuses mainly on primary prevention.
- **Part IV.** In Chapter 9, the main focus shifts to secondary prevention by describing the kinds of health services that are available and considering why people use, do not use, and delay using these services.

This chapter also examines patients' relationships to practitioners and problems in adhering to medical regimens. Chapter 10 discusses the hospital setting and personnel, how people react to being hospitalized and cope with stressful medical procedures, and the role psychologists play in helping patients cope with their illnesses and medical treatments.

- **Part V.** Chapters 11 and 12 explore the physical and psychological nature of pain, ways to assess patients' discomfort, the psychosocial impact of pain, and methods for managing and controlling pain.
- **Part VI.** The two chapters in this part of the book emphasize tertiary prevention. They examine different chronic health problems, their impact on patients and their families, and medical and psychosocial treatment approaches. The chapters separate illnesses on the basis of mortality rates. Chapter 13 focuses on health conditions, such as diabetes and arthritis, that have either very low or moderate rates of mortality and may lead to other health problems or disability. In contrast, Chapter 14 examines four high-mortality illnesses—heart disease, stroke, cancer, and AIDS—and people's reactions to losing a loved one.
- **Part VII.** Chapter 15 discusses goals and issues for the future of health psychology.

OPTIONAL ORGANIZATION

Because some instructors might like some *flexibility in the organization of chapters*, Chapters 10 through 14 were written with this possibility in mind. Chapter 10, Part V, and Part VI are written as three independent units that may be covered in any order. Two examples of alternate sequences that would work nicely after Chapter 9 are: (1) Part V, Part VI, and then Chapter 10; and (2) Part VI, Chapter 10, and then Part V.

LANGUAGE AND STYLE

The field of health psychology involves complex issues and technical information that require extra efforts to make the material readable and clear without sacrificing content. To accomplish this, we have limited the use of jargon in this book and have sought to write in a concrete and engaging fashion. The gradual progression of concepts, choice of words, and structure of each sentence were all designed to help students master and retain the material. When introducing new terms, we define them immediately. Many examples and case studies are included to clarify concepts and to bring them to life.

LEARNING AIDS

This book contains many pedagogical features. Each chapter begins with a *contents* list, giving students an overview of the progression of major topics and concepts. Then a *prologue* introduces the chapter with (1) a lively and engaging vignette that is relevant to the chapter material and (2) an overview of the basic ideas to be covered. The body of each chapter includes many *figures*, *tables*, and *photographs* to clarify concepts or research findings. For example, special figures were created to show how the immune system functions and how gate-control theory explains pain perception. Important terms are **boldfaced,** and *italics* are used liberally for other terms and for emphasis.

Throughout the book, three types of boxed material are presented to fit with the surrounding content. They are identified in the text with the corresponding icons:

Highlight. This type of box focuses on high-interest and in-depth topics. Some of these topics are: careers relating to health and psychology, health behaviors to protect against breast cancer, the effects of secondhand smoke, acute pain in burn patients, and the complex medical regimens for diabetes.

Assess Yourself. This boxed feature has students actively examine their own health-related characteristics, such as their lifestyles, typical daily hassles, ways of coping with stress, knowledge about the transmission of HIV, beliefs about alcohol use, and symptoms of health problems.

Clinical Methods and Issues. The third type of boxed material focuses on methods and issues in application efforts in clinical health psychology, medicine, public health, and rehabilitation. We examine, for instance, cognitive and behavioral methods that can help people reduce stress, stop smoking, and eat healthfully; biofeedback and relaxation techniques for treating asthma and some forms of paralysis; and procedures to prepare children for being hospitalized.

Each chapter ends with a substantial *summary* and a list of *key terms*. All these terms are redefined in the *glossary* at the back of the book.

ONLINE SUPPLEMENTS

Instructors who are using this text can access a Companion Website at www.wiley.com after registering and obtaining a password. It contains:

- An *instructor's manual* with information to help instructors organize and present the subject

matter effectively and enrich the classroom experience through activities and discussion.

- A *test bank*.
- *Powerpoint slides* with figures and tables from the text are available for download.
- Access to *Psychology Select*, a custom-publishing program that provides a database of materials from which you can create your own custom course-pack of readings, journal articles, and research articles.

The book's Companion Website also includes features specifically for students, such as *chapter quizzes* and over a dozen *interactive animations* that show how physiological systems work, describe the effects of homeostatic imbalances on them, and present case studies of people with health problems and their diagnostic signs and symptoms.

ACKNOWLEDGMENTS

Writing this book and revising it have been enormous tasks. We are indebted first of all to the thousands of researchers whose important and creative work we have cited. There would be no health psychology without their work. We also received a great deal of direct help and encouragement from a number of people whose contributions we gratefully acknowledge.

Across editions, the textbook review process generated many helpful suggestions that have made this a better book than it would have been otherwise. Reviewers of the book deserve our heartfelt thanks for their ideas and favorable comments regarding plans for the book and the major parts of the manuscript they read. The new edition has benefited greatly from the review process and excellent perspectives of the following colleagues:

Because each new edition retains many of the features of earlier editions of the book, we continue to be indebted to the reviewers for those editions. Their names and affiliations (when the reviews were done) are given on the book's companion website.

Very personal thanks go to the closest people in our lives—family, friends, and colleagues—for encouraging and supporting our efforts to complete this book and for tolerating our preoccupation.

***Edward* P. Sarafino *and* Timothy W. Smith**

TO THE STUDENT

"I wish I could help my father stop smoking," a health psychology student said at the start of the semester. Maybe she did help—he quit by the end of the course. This example points out two things that will probably make health psychology interesting to you: (1) the material is *personally relevant* and (2) many of the things you learn can actually be *applied* in your everyday life. Studying health psychology will also help you answer important questions you may have considered about health and psychology in the past. Does the mind affect our health—and if so, how? What effect does stress have on health and recovery from illness? What can be done to help people lead more healthful lives than they do? Why don't patients follow their doctors' advice, and what can health care workers do to help? What special needs do children have as patients, and how can parents and health care workers address these needs? How can families, friends, and health care workers help patients adjust to disabling or life-threatening health problems?

As these questions indicate, knowledge of health psychology can be relevant both now and later when you enter *your future career*. This is so whether you are studying to be a psychologist, medical social worker, nurse or physician, physical or occupational therapist, public health worker, or health educator. You will learn in this course that the relationship between the person's health and psychology involves a "two-way street"—each affects the other. Psychological factors go hand in hand with medical approaches in preventing and treating illness and in helping patients adjust to the health problems they develop.

THE BOOK AND WEBSITE

This book was designed for you, the reader. First and foremost, it provides a thorough and up-to-date presentation of the major issues, theories, concepts, and research in health psychology. Throughout the book, the major point of view is "biopsychosocial"—that is, that health and illness influence and result from the interplay of biological, psychological, and social aspects of people's lives. Because integrating these aspects involves complex concepts and technical material, we have made special efforts to write in a straightforward, clear, and engaging fashion.

FEATURES OF THE BOOK

To help you master the material and remember it longer, the book includes the following learning aids:

- **Chapter Contents and Prologue.** Each chapter begins with a contents list that outlines the major topics in the order in which they are covered. The prologue then introduces the chapter with a vignette that is relevant to the material ahead and gives an overview of the basic ideas you will read about.
- **Illustrations.** The many figures, tables, and photographs in each chapter are designed to clarify concepts and research findings and help them stick in your mind.
- **Boxed material.** Three types of boxed material are included in the chapters. Each type of box has a special icon that is used in "Go to . . ." instructions, prompting you to read the appropriate box at the right point in the text.
- **Summary and Key Terms.** Each chapter closes with two features: (1) the summary, which presents the most important ideas covered, and (2) the key terms—a list of the most important terms in the chapter, arranged in order of their appearance.
- **Glossary.** The glossary at the back of the book gives definitions of important terms and concepts, along with pronunciation keys for the most difficult words. It will be useful when you are studying or reading and are not sure of the exact meaning or pronunciation of a term.

THE WEBSITE

To enhance your learning experience, you can access this book's *Companion Website* at www.wiley.com/college/sarafino. This website contains *links to websites* of illness-related organizations and:

- *Chapter quizzes*, which contain multiple-choice items, separated by chapter. For each item, the approximate page number of the textbook where the topic was

discussed is given. For Chapter 2, the items are separated also by modules, enabling easy use for students who are covering the entire chapter at once or are distributing the modules to other chapters. The software provides feedback, telling you how well you performed for each chapter and module and which items you missed.

- I*nteractive animations* that will (1) help you learn how each physiological system of the body operates and (2) describe case studies of people with serious health problems. Announcements of the animations are given in the text with the relevant material, telling you that they are available and how to access them. When you use the website, click on Health Psychology Animations and Interactions and then on the title of the animation you want to review. The animations provide instructions—voice and written (which has the icon ☐)—and a bar at the bottom of the screen to control the progress and sound. Each animation takes 5 to 10 minutes to do.

STUDY HINTS

There are many ways you can use the features of this book to learn and study well, and you may want to experiment to find the best way for you. We will describe one method that works well for many students.

S*urvey* the chapter first. Read the contents list and browse through the chapter, examining the figures, tables, and photographs. Some students also find it useful to read the summary first, even though it contains terms they may not yet understand. Then read the prologue. As you begin each new section of the chapter, look at its title and turn it into a *question*. Thus, the heading early in Chapter 1, "An Illness/Wellness Continuum," might become "What is an illness/wellness continuum?" Doing this helps you focus on your reading. After reading the section, *reflect* on what you have just read. Can you answer the question you asked when you reworded the title?

When you have finished the body of the chapter, *review* what you have read by reading the summary and trying to define the items in the list of key terms. If there is something you do not understand, look it up in the chapter or glossary. Last, *reread* the chapter at least once, concentrating on the important concepts or ideas. You may find it helpful to underline or highlight selected material now that you have a good idea of what is important. If your exam will consist of "objective" questions, such as multiple choice, using this approach intensively should be effective. If your exam will have essay items, you will probably find it helpful to develop a list of likely questions and write an outline or a complete answer for each one.

We hope that you enjoy this book, that you learn a great deal from it, and that you will share our enthusiasm and fascination for health psychology by the time you finish the course.

***Edward* P. Sarafino *and Timothy* W. Smith**

BRIEF CONTENTS

CONTENTS

PART I
AN INTRODUCTION: BASIC ISSUES AND PROCESSES

1
AN OVERVIEW OF PSYCHOLOGY AND HEALTH

PROLOGUE

"I suppose I should feel lucky, but mostly I just feel really lousy," Alec said from his bed in the intensive care unit the day after open heart surgery. "We're all lucky, but things in our lives need to change," replied Nancy, his worried and exhausted wife, grateful that she still had a husband and their two college-age girls still had a father. It was a close call.

In the prior few weeks, Alec had noticed he was more tired than usual, became short of breath during exertion, and had odd sensations that felt like indigestion. He first thought that his demanding job managing an electronics store was getting to him, making for long days, too little sleep, and too much fast food at the mall where he worked. He decided his symptoms were temporary; "I just need a vacation," he thought. But at home two days ago, Nancy noticed he was perspiring excessively and complaining of nausea and pain in his left shoulder, so she insisted that he go to the hospital. Alec was lucky. Thanks to his wife, he got treatment before his heart suffered much damage. He would be in the hospital for a few more days, and then sent home to a life changed in ways he was only beginning to grasp.

Nancy was right about their lives changing. To avoid further heart trouble in the future, Alec would have to adhere faithfully to a medical regimen that included several daily medicines and some major lifestyle changes. He would need to watch his diet, get regular exercise for the first time in many years, and reduce the stress he felt at work. Nancy knew that Alec's father had died of a heart attack at a young age, and hoped that these changes would help limit any susceptibility to heart disease Alec may have inherited. She also knew she would have to help him stick with his lifestyle changes, but felt they were essential for Alec and could also be good for her and for their girls if they made them as well.

This story about Alec and his family illustrates important issues related to health. For instance, our dietary and activity habits can contribute to serious illnesses. Current medical care can save lives, but people undergo complex decisions about whether or not they need care and whether to follow medical advice when they get it. Making the correct decisions can be a matter of life and death. Also, people's everyday stress can influence their health, and developing a health problem can become a major source of stress. Health problems affect the patients and their families, and their interrelationships can promote the health of all of them. In this book, we will examine the relationships between health and many biological, psychological, and social factors in people's lives.

This chapter introduces a relatively new and exciting field of study called *health psychology*. We look at its scope, its history, its research methods, and how it draws on and supports other sciences. As we study these topics, you will begin to see how health psychologists would answer such questions as: Does the mind affect our health? What role does the cultural background of individuals play in their health? Does the age of a person affect how he or she deals with issues of health and illness? But first, let's begin with a definition of health.

WHAT IS HEALTH?

You know what health is, don't you? How would you define it? You would probably mention something about health being a state of feeling well and not being sick. We commonly think about health in terms of an absence of (1) objective *signs* that the body is not functioning properly, such as measured high blood pressure, or (2) subjective *symptoms* of disease or injury, such as pain or nausea (Kazarian & Evans, 2001; MedlinePlus, 2015). Dictionaries define health in this way, too. But there is a problem with this definition of health. Let's see why.

AN ILLNESS/WELLNESS CONTINUUM

Consider Alec, in the opening story. Before he noticed growing fatigue and other vague symptoms, was he healthy? Even though he had no outward signs of the serious illness he was about to suffer, his diet was poor, and he got far too little exercise. In fact, his heart disease had begun many years before, progressing with no obvious signs or symptoms. What about someone who feels fine but whose lungs are being damaged from smoking cigarettes? These are all signs of improper body functioning. Are people with these signs healthy? We probably would say they are not "sick"—they are just *less* healthy than they would be without the unhealthful conditions.

This means health and sickness are not entirely separate concepts—they overlap. There are degrees of wellness and of illness. Medical sociologist Aaron Antonovsky (1979, 1987) has suggested that we consider these concepts as ends of a continuum, noting that "We are all terminal cases. And we all are, so long as there is a breath of life in us, in some measure healthy" (1987, p. 3). He also proposed that we revise our focus, giving more attention to what enables people to stay well than to what causes people to become ill. Figure 1-1 presents a diagram of an **illness/wellness continuum**, with *death* at one end and *optimal wellness* at the other.

We will use the term **health** to mean a positive state of physical, mental, and social well-being—not simply the absence of injury or disease—that varies over time along a continuum. At the wellness end of the continuum, health is the dominant state. At the other end of the continuum, the dominant state is illness or injury, in which destructive processes produce characteristic signs, symptoms, or disabilities.

ILLNESS TODAY AND IN THE PAST

People in the United States and other developed, industrialized nations live longer, on the average, than they did in the past, and they suffer from a different pattern of illnesses. During the 17th, 18th, and 19th centuries, people in North America suffered and died chiefly from two types of illness: dietary and infectious (Grob, 1983). *Dietary diseases* result from malnutrition—for example, beriberi is caused by a lack of vitamin B_1 and is characterized by anemia, paralysis, and wasting away. **Infectious diseases** are acute illnesses caused by harmful matter or microorganisms, such as bacteria or viruses, in the body. In much of the world today, infectious diseases continue to be a main cause of death. Specifically, in lower income or developing countries, lower respiratory infections such as pneumonia and

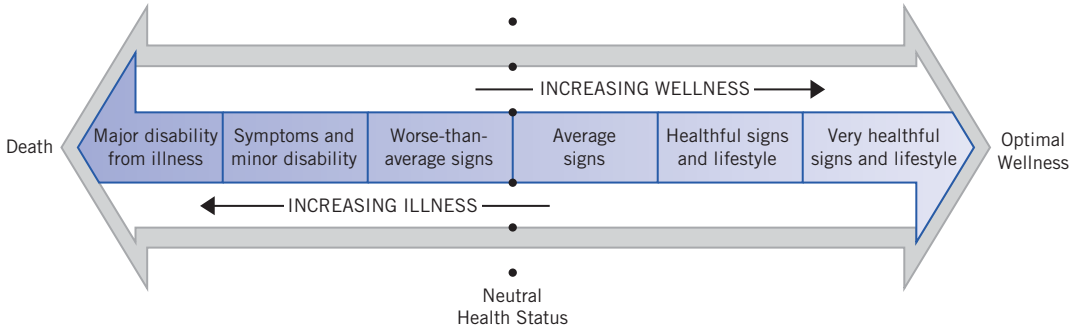


Figure 1-1 An illness/wellness continuum to represent people's differing health statuses. Starting at the center (neutral level) of the diagram, a person's health status is shown as progressively worse to the left and progressively healthful as it moves to the right. The segments in the central band describe dominant features that usually characterize different health statuses, based on the person's *physical condition*—that is, his or her signs (such as blood pressure), symptoms, and disability—and *lifestyle*, such as his or her amount of regular exercise, cholesterol consumption, and cigarette smoking. Medical treatment typically begins at a health status to the left of the neutral level and intensifies as the physical condition worsens. Medical treatment can bring the person's health status back to the mid-range of the continuum, but healthful lifestyles can help, too. Increasing wellness beyond the mid-range can be achieved through lifestyle improvements. (Based on information in Antonovsky, 1987; Bradley, 1993; Ryan & Travis, 1981.)

tuberculosis, diarrheal diseases, and HIV/AIDS are the leading causes of death (WHO, 2014).

A good example of the way illness patterns have changed in developed nations comes from the history of diseases in the United States. From the early colonial days in America through the 18th century, colonists experienced periodic epidemics of many infectious diseases, especially smallpox, diphtheria, yellow fever, measles, and influenza. It was not unusual for hundreds, and sometimes thousands, of people to die in a single epidemic. Children were particularly hard hit. Two other infectious diseases, malaria and dysentery, were widespread and presented an even greater threat. Although these two diseases generally did not kill people directly, they weakened their victims and reduced their ability to resist other fatal diseases. Most, if not all, of these diseases did not exist in North America before the European settlers arrived—the settlers brought the infections with them—and the death toll among Native Americans skyrocketed. This high death rate occurred for two reasons.

Bettman/Corbis Images

Epidemics of deadly infectious diseases have occurred throughout the world. Before the 20th century, there were no effective methods for prevention or treatment of the plague, for instance, which is the disease illustrated in this engraving.

First, the native population had never been exposed to these new microorganisms, and thus lacked the natural immunity that our bodies develop after lengthy exposure to most diseases (Grob, 1983). Second, Native Americans' immune functions were probably limited by a low degree of genetic variation among these people (Black, 1992).

In the 19th century, infectious diseases were still the greatest threat to the health of Americans. The illnesses of the colonial era continued to claim many lives, but new diseases began to appear. The most significant of these diseases was tuberculosis, or "consumption" as it was often called. In 1842, for example, consumption was listed as the cause for 22% of all deaths in the state of Massachusetts (Grob, 1983). But by the end of the 19th century, deaths from infectious diseases had decreased sharply. For instance, the death rate from tuberculosis declined by about 60% in a 25-year period around the turn of the century.

Did this decrease result mostly from advances in medical treatment? Although medical advances helped to some degree, the decrease occurred before effective vaccines and medications were introduced. This was the case for most of the major diseases we've discussed, including tuberculosis, diphtheria, measles, and influenza (Grob, 1983; Leventhal, Prohaska, & Hirschman, 1985). It appears that the decline resulted chiefly from *preventive* measures such as improved personal hygiene, greater resistance to diseases (owing to better nutrition), and public health innovations, such as building water purification and sewage treatment facilities. Many people had become concerned about their health and began to heed the advice of health reformers like William Alcott, an advocate of moderation in diet and sexual behavior (Leventhal, Prohaska, & Hirschman, 1985). Fewer deaths occurred from diseases because fewer people contracted them.

The 20th century witnessed great changes in the patterns of illness afflicting people. The death rate from life-threatening infectious diseases declined, and people's average life expectancy increased dramatically. For example, at the turn of the century in the United States, the life expectancy of babies at birth was about 48 years (USDHHS, 1987); today it is nearly 79 years (NCHS, 2013). Figure 1-2 shows this change and an important reason for it: the death rate among children was very high many years ago. Babies who survived their first year in 1900 could be expected to live to about 56 years of age, adding 7 years to their expected total life span. Moreover, people in 1900 who had reached the age of 20 years could expect to live to almost 63 years of age. Today, the death rate for American children is much lower, and only a small difference exists in the expected total life span for newborns and 20-year-olds. Developed countries around the world experienced similar histories.

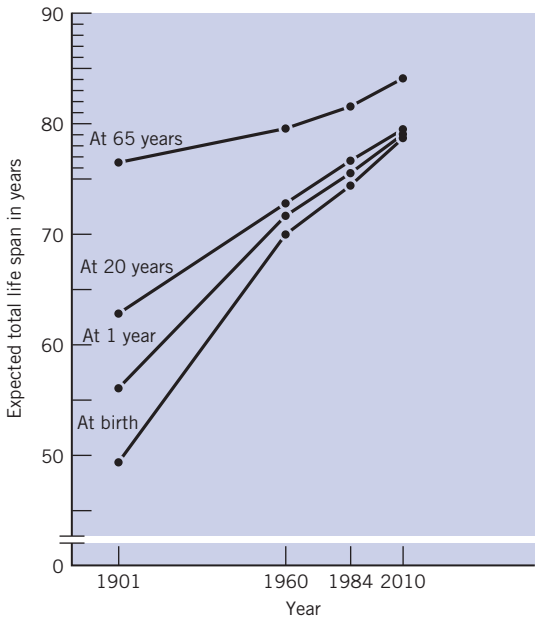


Figure 1-2 Expected total life span at various years since 1900 for people in the United States who were born in the specified year or had reached 1 year, 20 years, or 65 years of age. (Data from USDHHS, 1987, p. 2, for years 1900–1902, 1959–1961, and 1984; NCHS, 2013, Table 7, for 2010.)

Death is still inevitable, of course, but people die at later ages now and from different causes. The main health problems and causes of death in developed countries today are **chronic diseases**—that is, degenerative illnesses, such as heart disease, cancer, and stroke—that develop or persist over a long period of time. And worldwide, chronic illnesses account for more than half of all deaths (WHO, 2014). These diseases are not new, but they were responsible for a much smaller proportion of deaths before the 20th century. Why? One reason is that people's lives are different today. For example, more people today survive to old age, and chronic diseases are more likely to afflict older than younger individuals. Thus, a major reason for the current prominence of chronic diseases is that more people are living to the age when they are at high risk for contracting them. In addition, the growth of industrialization increased people's stress and exposure to harmful chemicals. Trends show that chronic diseases are increasing rapidly in low income or developing nations of the world: in the next few decades, deaths due to infectious diseases other than HIV/AIDS are expected to decrease, and deaths from cardiovascular disease; tobacco-related chronic disease; and chronic

diseases related to obesity, such as diabetes, are likely to rise (Mathers & Loncar, 2006).

Are the main causes of death in childhood and adolescence different from those in adulthood? Yes. In the United States, for example, the leading cause of death in children and adolescents, by far, is not an illness, but accidental injury (NCHS, 2013). In the age range from 1 to 24 years, about 40% of deaths result from accidents, frequently involving automobiles. In this age group, the next three most frequent causes of death are suicide, cancer, and cardiovascular diseases, all of which are far more common among 15- to 24-year-olds than for younger ages. Clearly, the role of disease in death differs greatly at different points in the life span.

VIEWPOINTS FROM HISTORY: PHYSIOLOGY, DISEASE PROCESSES, AND THE MIND

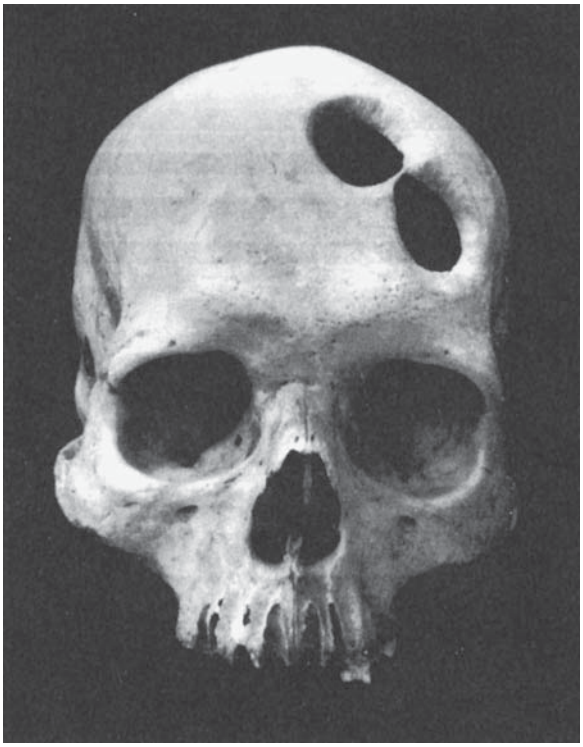
Is illness a purely physical condition? Does a person's mind play a role in becoming ill and getting well? People have wondered about these questions for thousands of years, and the answers they have arrived at have changed over time.

EARLY CULTURES

Although we do not know for certain, it appears that the best educated people thousands of years ago believed physical and mental illness were caused by mystical forces, such as evil spirits (Benyamini, 2011). Why do we think this? Researchers found ancient skulls in several areas of the world with coin-size circular holes in them that could not have been battle wounds. These holes were probably made with sharp stone tools in a procedure called *trephination*. This procedure was done presumably for superstitious reasons—for instance, to allow illness-causing demons to leave the head. Because there are no written records from those times, we can only speculate about the reasons for the holes.

ANCIENT GREECE AND ROME

The philosophers of ancient Greece produced the earliest written ideas about physiology, disease processes, and the mind between 500 and 300 B.C. Hippocrates, often called "the Father of Medicine," proposed a *humoral theory* of illness. According to this theory, the body contains four fluids called *humors* (in biology, the term *humor* refers to any plant or animal fluid). When the mixture of these humors is harmonious or balanced, we are in a state of health. Disease occurs when the mixture is faulty (Friedman & Adler, 2011; Stone, 1979). Hippocrates recommended eating a good diet and avoiding excesses to help achieve humoral balance.



John Verano, National Museum of Natural History; courtesy Smithsonian Institution

A skull with holes probably produced by trephination. This person probably survived several of these procedures.

Greek philosophers, especially Plato, were among the first to propose that the mind and the body are separate entities (Marx & Hillix, 1963; Schneider & Tarshis, 1975). The mind was considered to have little or no relationship to the body and its state of health. This remained the dominant view of writers and philosophers for more than a thousand years. Today, the body and mind are separate concepts: The *body* refers to our physical being, including our skin, muscles, bones, heart, and brain; the *mind* refers to an abstract process that includes our thoughts, perceptions, and feelings. Although we can separate the mind and body conceptually, an important issue is whether they function independently. The question of their relationship is called the **mind/body problem.**

Galen was a famous and highly respected physician and writer of the 2nd century A.D. who was born in Greece and practiced in Rome. Although he believed generally in the humoral theory and the mind/body split, he made many innovations (Friedman & Adler, 2011). For example, he "dissected animals of many species

(but probably never a human), and made important discoveries about the brain, circulatory system, and kidneys" (Stone, 1979, p. 4). From this work, he became aware that illnesses can be localized, with pathology in specific parts of the body, and that different diseases have different effects. Galen's ideas became widely accepted.

THE MIDDLE AGES

After the collapse of the Roman Empire in the 5th century A.D., much of the Western world was in disarray. The advancement of knowledge and culture slowed sharply in Europe and remained stunted during the Middle Ages, which lasted almost a thousand years. The influence of the Church in slowing the development of medical knowledge during the Middle Ages was enormous. According to historians, the Church regarded the human being

> as a creature with a soul, possessed of a free will which set him apart from ordinary natural laws, subject only to his own willfulness and perhaps the will of God. Such a creature, being free-willed, could not be an object of scientific investigation. Even the body of man was regarded as sacrosanct, and dissection was dangerous for the dissector. These strictures against observation hindered the development of anatomy and medicine for centuries. (Marx & Hillix, 1963, p. 24)

The prohibition against dissection extended to animals as well, as they were thought to have souls, too.

People's ideas about the cause of illness took on pronounced religious overtones, and the belief in demons became strong again (Sarason & Sarason, 1984). Sickness was seen as God's punishment for doing evil things. As a result, the Church came to control the practice of medicine, and priests became increasingly involved in treating the ill, often by torturing the body to drive out evil spirits.

It was not until the 13th century that new ideas about the mind/body problem began to emerge. The Italian philosopher St. Thomas Aquinas rejected the view that the mind and body are separate and saw them as interrelated (Leahey, 1987). Although his position did not have as great an impact as others had had, it renewed interest in the issue and influenced later philosophers.

THE RENAISSANCE AND AFTER

The word *renaissance* means rebirth—a fitting name for the 14th and 15th centuries. During this period in history, Europe saw a rebirth of inquiry, culture, and politics. Scholars became more "human-centered" than "God-centered" in their search for truth and "believed that truth can be seen in many ways, from many individual perspectives" (Leahey, 1987, p. 80). These ideas set the stage for important changes in philosophy once the scientific revolution began after 1600.

The 17th-century French philosopher and mathematician René Descartes probably had the greatest influence on scientific thought of any philosopher in history (Schneider & Tarshis, 1975). Like the Greeks, he regarded the mind and body as separate entities, but he introduced three important innovations. First, he conceived of the body as a machine and described the mechanics of how action and sensation occurred. For example, Figure 1-3 shows his concept of how we experience pain. Second, he proposed that the mind and body, although separate, could *communicate* through the pineal gland, an organ in the brain (Leahey, 1987). Third, he believed that animals have no soul and that the soul in humans leaves the body at death (Marx & Hillix, 1963). This belief meant that dissection could be an acceptable method of study—a point the Church was now ready to concede (Engel, 1977).

In the 18th and 19th centuries, knowledge in science and medicine grew quickly, helped greatly by improvements in the microscope and the use of dissection in autopsies. Once scientists learned the basics of how the body functioned and discovered that microorganisms cause certain diseases, they rejected the humoral theory of illness and proposed new theories. The field of surgery flourished after antiseptic techniques and anesthesia were introduced in the mid-19th century (Stone, 1979). Before then, hospitals were "notorious places, more likely to spread diseases than cure them" (Easterbrook, 1987, p. 42). Over time, the reputation of physicians and hospitals began to improve, and people's trust in the ability of doctors to heal increased.

These advances, coupled with the continuing belief that the mind and body are separate, laid the foundation for a new approach, or "model," for conceptualizing health and illness. This approach—called the **biomedical model**—proposes that all diseases or physical disorders can be explained by disturbances in physiological processes, which result from injury, biochemical imbalances, bacterial or viral infection, and the like (Engel, 1977; Suls, Luger, & Martin, 2010). The biomedical model assumes that disease is an affliction of the body and is separate from the psychological and social processes of the mind. This viewpoint became widely accepted during the 19th and 20th centuries and still represents the dominant view in medicine today.

Yet, during this formative period of the biomedical approach, some physicians took the view that the mind

Figure 1-3 Descartes' concept of the pain pathway. Descartes used this drawing to illustrate the mechanisms by which people experience and respond to pain: The heat of the fire (at A) sends tiny particles to the foot (B) that pull on a thread that courses from the foot to the head. This action opens a pore (de), releasing spirits from a cavity (F) that travel to the parts of the body that respond (e.g., the leg moves away). (From Descartes, 1664, Figure 7.)

could influence health. For instance, in Sir William Osler's late 19th century view of heart disease,

> In the worry and strain of modern life, arterial degeneration is not only very common, but occurs often at a relatively early age. For this the high pressure at which men live, and the habit of working the machine to its maximum capacity, are responsible, rather than excesses in eating and drinking (Osler, 1897, pp. 153–154).

Although we might disagree with Osler about the role of diet and alcohol intake in heart disease, we'll see later that his view of the role of stress and related aspects of everyday life on the heart has validity; this view has become a focus of modern medical research.

SEEING A NEED: PSYCHOLOGY'S ROLE IN HEALTH

The biomedical model has been very useful, guiding researchers to make enormous achievements. They conquered many infectious diseases, such as polio and measles, through the development of vaccines. They also developed antibiotics, which made it possible to cure illnesses caused by bacterial infection. Despite these great advances, the biomedical model needs improvement. Let's see why.

PROBLEMS IN THE HEALTH CARE SYSTEM

Scarcely a week goes by when we don't hear through the mass media that health care costs are rising rapidly, particularly for prescription drugs and for hospital and nursing home care. Countries worldwide have been facing escalating costs in health care. For example, between 1960 and today the United States saw a 63-fold increase (to over $9,200) in the amount of money spent per capita on health care, and total health costs increased from about 5% to 17.4% of the gross domestic product (NCHS, 2015). In Canada and most European countries, total health costs are now at about 9% to 12% of their gross domestic products (WHO, 2014). Because medical costs continue to rise rapidly, we need to consider new approaches for improving people's health.

We've seen that the patterns of illness affecting people have changed, particularly in developed nations, where the main health problems now are chronic diseases. Consider cancer, for example. Although a great deal of progress is being made in understanding the causes of cancers, improvements in techniques for treating them have been modest: gains in cancer survival rates from the 1950s to the 1980s, for instance, resulted

more from earlier detection of the disease than from improved treatments (Boffey, 1987). Although detection occurs earlier today partly because diagnostic methods have improved, another part of the reason is that *people* have changed. Many individuals are more aware of signs and symptoms of illness, more motivated to take care of their health, and better able to afford visits to physicians than they were in the past. These factors are clearly important and relate to psychological and social aspects of the person. But *the person* as a unique individual is not included in the biomedical model (Engel, 1977, 1980).

"THE PERSON" IN HEALTH AND ILLNESS

Have you ever noticed how some people are "always sick"—they get illnesses more frequently than most people do and get well more slowly? These differences between people can result from biomedical sources, such as variations in physiological processes and exposure to harmful microorganisms. But psychological and social factors also play a role. Let's look briefly at two of these factors: the lifestyle and personality of the person. (Go to —as described in the Preface, this instruction prompts you to read the nearby boxed material that has the same icon.)

Lifestyle and Illness

Earlier we saw that the occurrence of infectious diseases declined in some nations in the late 19th century chiefly because of preventive measures, such as improved nutrition and personal hygiene. These measures involved changing people's *lifestyles*—their everyday patterns of behavior, such as in washing, preparing, and eating healthful foods. Changes in people's lifestyles can also reduce chronic illnesses. Let's see how.

Characteristics or conditions that are associated with the development of a disease or injury are called **risk factors** for that health problem. Although some risk factors are *biological*, such as having inherited certain genes, others are *behavioral*. For example, it is well known that people who smoke cigarettes face a much higher risk of developing cancer and other illnesses than nonsmokers do. Other risk factors for cancer include eating diets high in saturated fat and having a family history of the disease. People who "do more" or "have more" of these characteristics or conditions are more likely to contract cancer than people who "do less" or "have less" of these factors. Keep in mind that a risk factor is *associated* with a health problem—it does not necessarily *cause* the problem. For example, being an African American man is a risk factor for prostate cancer (ACS, 2015), but that status does not cause the disease—at least, not directly.

Many risk factors result from the way people live or behave, such as smoking cigarettes and eating unhealthful diets. Some behavioral risk factors associated with the five leading causes of death in the United States are:

1. *Heart disease*—smoking, high dietary cholesterol, obesity, and lack of exercise.
2. *Cancer*—smoking, high alcohol use, and diet.
3. *Stroke*—smoking, high dietary cholesterol, and lack of exercise.
4. COPD (chronic lung diseases, e.g., emphysema)—smoking.
5. *Accidents* (including motor vehicle)—alcohol/drug use and not using seat belts. (*Sources*: ACS, 2015; AHA, 2015; ALA, 2015; NHTSA, 2015)

ASSESS YOURSELF

What's Your Lifestyle Like?

At various points in this book, you'll find brief self-assessment surveys like this one that you should try to fill out as accurately as you can. These surveys relate to the nearby content of the chapter, and most of them can be completed in less than a minute or two.

This survey assesses seven aspects of your *usual* lifestyle. For each of the listed practices, put a check mark in the preceding space if it describes your usual situation.

_____ I sleep 7 or 8 hours a day.
_____ I eat breakfast almost every day.
_____ I rarely eat a lot between meals.
_____ I am at or near the appropriate weight for my height (see Table 8.4 on page 208)
_____ I never smoke cigarettes.
_____ I drink alcohol rarely or moderately.
_____ I regularly get vigorous physical activity.

Count the check marks—six or seven is quite good. The more of these situations that describe your lifestyle now and in the future, the better your health is likely to be, particularly after the age of 50.

Many of the people who are the victims of these illnesses and accidents live for at least a short while and either recover or eventually succumb. Part of today's high medical costs result from people's lifestyles that contribute to their health problems, and society, not the individual, often bears the burden of medical costs through public and private health insurance programs.

How influential are lifestyle factors on health? Researchers studied this question by surveying nearly 7,000 adults who ranged in age from about 20 to over 75, asking them two sets of questions. One set asked about the health of these people over the previous 12 months—for instance, whether illness had prevented them from working for a long time, forced them to cut down on other activities, or reduced their energy level. The second set of questions asked about seven aspects of their lifestyles: sleeping, eating breakfast, eating between meals, maintaining an appropriate weight, smoking cigarettes, drinking alcohol, and getting physical activity. The questions you answered previously are similar to those in this research. When the researchers compared the data for people in different age groups, they found that at each age health was typically better as the number of healthful practices increased. In fact, the health of those who "reported following all seven good health practices was consistently about the same as those 30 years younger who followed few or none of these practices" (Belloc & Breslow, 1972, p. 419). And these health practices were also important in the future health of these people. Breslow (1983) has described later studies of the same people, conducted to find out which of them had died in the $9\frac{1}{2}$ years after the original survey. The data revealed that the percentage dying generally decreased with increases in the number of healthful behaviors practiced, and this impact was greater for older than younger people, especially among males. These findings suggest that people's practicing of healthful behaviors can reduce their risk of illness and early death substantially.

In the last several decades the evidence from this type of research has become clear and compelling. Summarizing this evidence across all of the leading sources of health care expenditures and causes of death in industrialized nations, a panel of experts reached a simple but telling conclusion: *behavior matters* (Fisher et al., 2011). Some behavioral risk factors, such as cigarette smoking, are less common than they once were, but others are more common. For example, the percentage of the population in the United States and many other industrialized nations that is seriously overweight has increased in recent decades, indicating that the behaviors that influence this health problem—such as diet and

Getty Images/Digital Vision

What risk factors for disease does this photo suggest this boy has developed?