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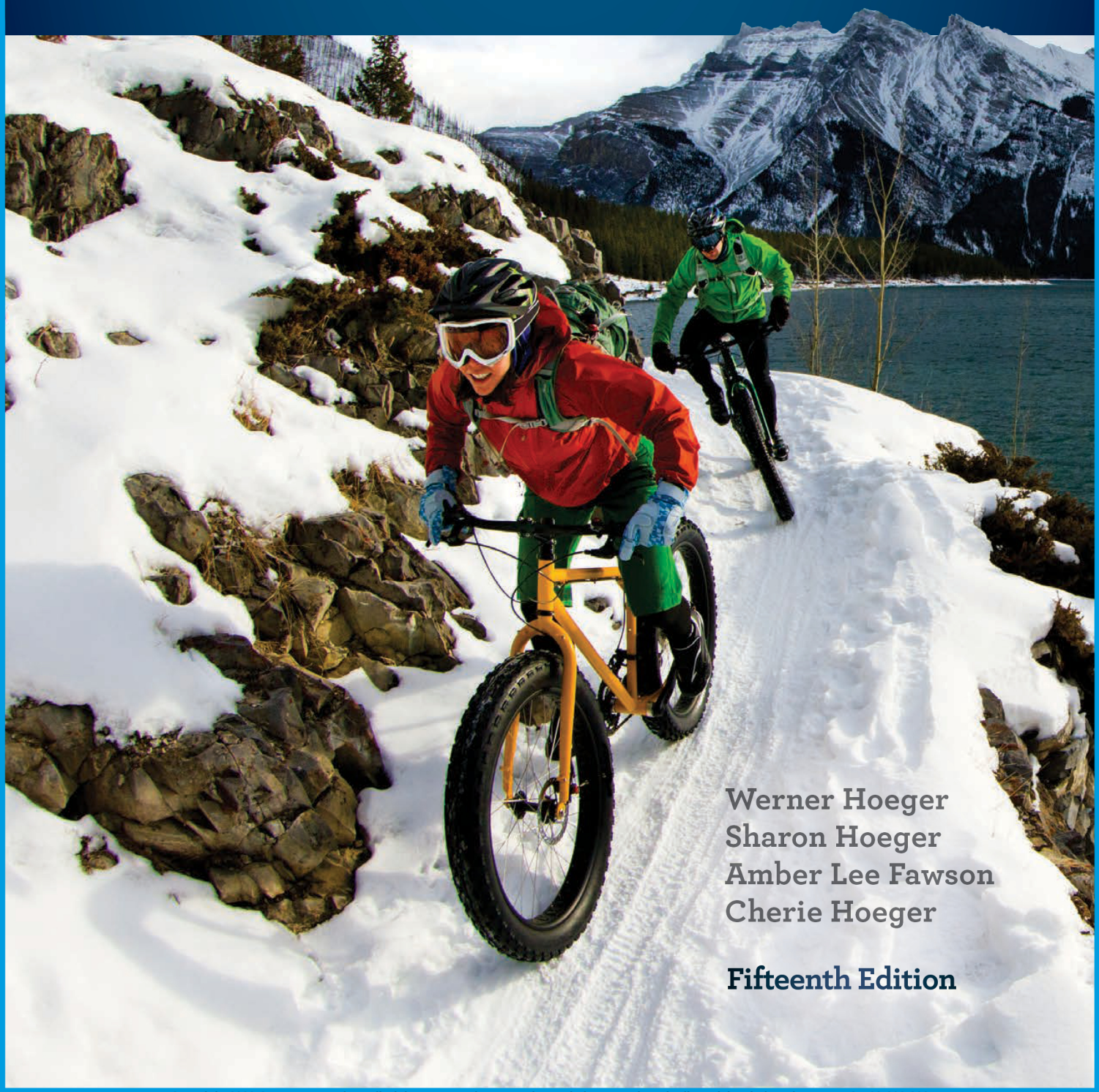
Principles and Labs for

Fitness&Wellness



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Fifteenth Edition

Principles and Labs for Fitness and Wellness

15e

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***Principles and Labs for Fitness and Wellness*, 15e**
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Cover Designer: Irene Morris

Cover Image: GibsonPictures/Getty Images

Library of Congress Control Number: 2018947014

Student Edition:
ISBN: 978-0-357-02025-8

Loose-leaf Edition:
ISBN: 978-0-357-02037-1

Cengage
20 Channel Center Street
Boston, MA 02210
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Printed in the United States of America
Print Number: 01 Print Year: 2018

Chapter Labs

Contents

Source: Chris Black

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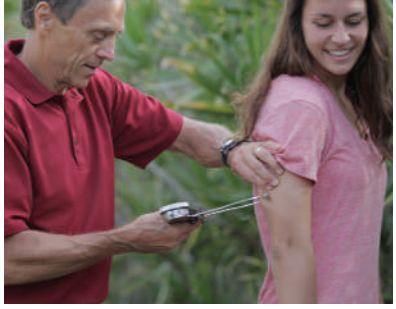

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Preface

The current American way of life does not provide people with sufficient physical activity to maintain good health and improve quality of life. Actually, our way of life is such a serious threat to our health that it increases the deterioration rate of the human body and leads to premature illness and death.

Data released by the Centers for Disease Control and Prevention (CDC) indicate that only about 23 percent of U.S. adults aged 18 to 64 meet the federal *Physical Activity Guidelines* for both aerobic and muscular fitness activities, whereas 45 percent are inactive and meet neither guideline. Yet, most people in the United States say they believe that physical activity and positive lifestyle habits promote better health. However, many do not reap benefits because they simply do not know how to implement a sound fitness and wellness program that will yield the desired results.

The U.S. Surgeon General has determined that lack of physical activity is detrimental to good health. As a result, the importance of sound fitness and wellness programs has assumed an entirely new dimension. The Office of the Surgeon General has identified physical fitness as a top health priority by stating that the nation's top health goals in this century are exercise, increased consumption of fruits and vegetables, smoking cessation, and the practice of safe sex. All four of these fundamental healthy lifestyle factors are thoroughly addressed in this book.

Furthermore, the science of behavioral therapy has established that many behaviors we adopt are a product of our environment. Unfortunately, we live in a "toxic" health and fitness environment. Becoming aware of how the environment affects our health is vital if we wish to achieve and maintain wellness. Yet, we are so habituated to this modern-day environment that we miss the subtle ways in which it influences our behaviors, personal lifestyle, and health each day.

Along with the most up-to-date health, fitness, and nutrition guidelines, the information in this book provides extensive behavior modification strategies to help you abandon negative habits and adopt and maintain healthy behaviors. As you study and assess physical fitness and wellness parameters, you need to take a critical look at your behaviors and lifestyle—and most likely make selected permanent changes to promote your overall health and wellness.

Principles and Labs for Fitness and Wellness contains 15 chapters and 42 laboratories (labs) that serve as guides to implement a complete lifetime fitness and wellness program. The book's contents point out the need to go beyond the basic components of fitness to achieve total well-being.

In addition to a thorough discussion of physical fitness—including all health- and skill-related components—extensive and up-to-date information is provided on behavior modification, nutrition, weight management, stress management, cardiovascular and cancer-risk reduction, exercise and aging, prevention of sexually transmitted infections (STIs), and substance abuse control (including tobacco, alcohol, and other psychoactive drugs). The information has been written to provide you with the necessary tools and guidelines for an active lifestyle and a wellness way of life.

Scientific evidence has clearly shown that improving the quality—and most likely the longevity—of your life is a matter of personal choice. As you work through the various chapters and laboratories in the book, you will be able to develop and regularly update your healthy lifestyle program to improve physical fitness and personal wellness. The emphasis throughout the book is on teaching you how to take control of your health and lifestyle habits so that you can make a constant and deliberate effort to stay healthy and achieve the highest potential for well-being.

New in the 15th Edition

For this 15th edition of *Principles and Labs for Fitness & Wellness,* the authors have reinvigorated the design to provide a modern and visually stimulating layout throughout the text and have developed and sourced many new figures, graphs, informational boxes, and photos in each chapter. Throughout the text, the authors have made substantial changes with the focus of finding new ways to help students understand and achieve a wellness way of life. Many chapters have been rethought and reorganized with new headings and enhanced introductory text.

All chapters have been revised and updated according to recent advances and recommendations in the field, including information reported in the literature and at professional health, fitness, and sports medicine conferences.

In addition to the Hoeger Key to Wellness boxes, we continue to provide the My Profile feature at the beginning of each chapter so that students can evaluate their current knowledge of the chapter's topic. Included also are Confident Consumer and Diversity Considerations boxes

to help students make healthier choices and be discerning fitness and wellness consumers. These features, along with the Real Life Story and FAQ sections, are intended to pique the students' interest in the chapter contents.

Chapter Updates

Chapter 1, Physical Fitness and Wellness

- Redesigned figures illustrating the leading causes of death, along with new information about medical error, a prominent and underreported cause of death
- A new figure that illuminates the short- and long-term benefits of exercise
- Increased focus on the mind-body connection throughout the wellness section
- Updated facts and statistics according to the latest research

Chapter 2, Behavior Modification

- An updated introduction and new information that focuses on personalized values
- New, helpful direction for choosing goals that align with individuality and personal nature and a new discussion regarding self-compassion
- The latest information from behavioral science, including new information about loss aversion and on choosing a growth verses a fixed mindset
- New, introductory information about serotonin and dopamine and their role in changing behavior
- A new figure that illustrates readiness to change according to confidence and motivation

Chapter 3, Nutrition for Wellness

- Improved organization of chapter contents
- Updated nutrition information throughout the chapter
- Key nutrients of concern have been updated
- New information on the roles of *simple carbohydrates (sugars), saturated fats,* and *proteins* in nutrition and health
- Expanded discussion of *omega fatty acids* and definition of the term *processed meats*
- New information on *phytonutrients, nuts,* and *probiotics*
- Updates to the *Antioxidants*, *Vitamin D, and Genetically Modified Crops* sections

Chapter 4, Body Composition

- A new figure emphasizing the connection between physical activity and android obesity
- A new section describing white, brown, and beige fat and their implications for health
- Expanded discussion of waist-to-height ratio and the way it is used to more accurately predict disease in public health measures
- The latest information connecting stress with visceral body fat

Chapter 5, Weight Management

- The most recent data and updated tables on the incidence of overweight and obesity in the United States published by the Centers for Disease Control and Prevention
- Discussion of racial and ethnic disparities in obesity
- Updated information on fad dieting
- Updates on the detrimental consequences of excessive body weight and *yo-yo dieting*
- New information on the principle of *dynamic energy balance* and its role in the *energy-balancing equation*
- Expanded discussion on the misleading rule of thumb that to lose one pound of fat all a person has to do is produce a caloric deficit of 3,500 calories
- Expanded discussion on the *overweight and fit debate*
- Inclusion of foods that are most commonly associated with weight gain and weight loss and the principle that "*a calorie may not always be a calorie*"
- Inclusion of foods that boost satiety
- New information on the critical role of exercise, both aerobic and strength training, to maintain energy expenditure following weight loss
- An introduction to weight gain and fat cell size and number increase in the lower body and abdominal areas
- Updates on the diagnostic criteria for eating disorders
- The various-calorie diet plans (daily food logs) have been revised to emphasize the importance of sufficient protein intake throughout the day and minimizing/eliminating the use of processed foods in the diet
- Additional suggestions for weight-loss strategies

Chapter 6, Cardiorespiratory Endurance

- The cardiorespiratory endurance assessment and exercise prescription principles conform with the newly released 2018 Guidelines for Exercise Testing and Prescription by the American College of Sports Medicine (ACSM)
- Enhanced discussion on "*Physical Stillness": A Deadly Proposition*

Chapter 7, Muscular Fitness

- Further data on the substantial benefits of strength training for health and the prevention of premature mortality, including cardiovascular and cancer deaths, based on the latest research
- Discussion of the effects of strength training and improved muscle mass on blood sugar control

- Enhanced discussion on the benefits of strength training and muscle mass maintenance throughout the lifespan
- New information on the association between grip strength and cardiovascular disease and premature mortality
- The provided strength-training exercise prescription is up-to-date with the current 2018 guidelines by the American College of Sports Medicine
- Expanded information on the effectiveness of light-to-moderate isometric strength training in both normotensive and hypertensive individuals

Chapter 8, Muscular Flexibility

- FITT-VP Flexibility Guidelines within the text and figures conform with the newly released 2018 Guidelines for Exercise Testing and Prescription by the American College of Sports Medicine
- Expanded information on the benefits of flexibility and introductory information on factors that affect flexibility: joint structure, genetics, age, gender, and other factors
- Expanded section on the most common causes of back pain and methods to prevent back pain from becoming chronic

Chapter 9, Fitness Programming and Skill Fitness

- Presentation of research surrounding popular ultra-short workouts
- New figures illustrating the use of periodization for personal fitness
- Reorganization of material to provide a greater focus on tools for building a realistic personalized exercise program

Chapter 10, Stress Assessment and Management Techniques

- New figure detailing the real-time effects of the fight-or-flight mechanism on the body and the long-term physiological risks of repeated activation of this mechanism due to chronic stress
- New key term *allostatic load* defined and explained in accordance with current research as the primary cause of disease vulnerability during the exhaustion stage of the general adaptation syndrome
- Improved organization of stress management strategies

Chapter 11, Preventing Cardiovascular Disease

- Up-to-date data on the prevalence of cardiovascular disease
- An update on exercise (both low aerobic and low muscular fitness at age 18), nutrition, and type 2 diabetes
- Updates on most of the cardiovascular disease risk factors based on new evidence reported in the literature, including the impact of fruit and vegetable consumption on blood cholesterol and stress on coronary heart disease
- Discussion of the effect of a person's MET level (cardiorespiratory fitness) on cardiovascular health and longevity
- New information about the importance of increased overall mobility throughout the day in the prevention of cardiovascular mortality
- List of foods that either promote or prevent premature mortality
- Inclusion of the new American Heart Association and the American College of Cardiology guidelines for the prevention, detection, evaluation, and management of blood pressure
- New information regarding lesser-known potential risk factors for coronary heart disease, including too much or too little sleep, depression, lack of laughter, and an excessively long work schedule

Chapter 12, Cancer Prevention

- New images illustrating the stages of cancer
- New, practical information for avoiding acrylamides
- Added information explaining why cancer screening recommendations can be so complex and can vary according to different organizations
- Updated facts and statistics regarding the incidence of cancer

Chapter 13, Addictive Behavior

- Data on the legalization of marijuana and alarming trends in prescription drug use, synthetic drug use, and drug overdose deaths have been updated and expanded
- New figure detailing the immediate and long-term benefits of smoking cessation
- Updated data on the most recent trends in substance abuse reported in the *National Survey on Drug Use and Health* by the U.S. Department of Health and Human Services

Chapter 14, Preventing Sexually Transmitted Infections

- Statistics and graphs on the prevalence of STIs have been added and updated according to the newest data from the Centers for Disease Control and Prevention (CDC)
- Updated HPV vaccination schedule recommendations for adolescents according to recently published CDC guidelines
- New information on the success of pre-exposure prophylaxis (PrEP) in reducing the risk of HIV among those at highest risk for infection

Chapter 15, Lifetime Fitness and Wellness

- Updated and expanded discussions on healthy lifestyle guidelines and complementary and alternative medicine use
- Revised resources for accessing credible research on health and wellness topics
- Updated guidelines for choosing a personal fitness trainer according to new national standards and exam requirements for credible certification

Ancillaries

- **Health MindTap for Principles and Labs for Fitness and Wellness.** A new approach to highly personalized online learning. Beyond an eBook, homework solution, digital supplement, or premium website, MindTap is a digital learning platform that works alongside your campus LMS to deliver course curriculum across the range of electronic devices in your life. MindTap is built on an "app" model allowing enhanced digital collaboration and delivery of engaging content across a spectrum of Cengage and non-Cengage resources.
- **Diet & Wellness Plus.** Diet & Wellness Plus helps you understand how nutrition relates to your personal health goals. Track your diet and activity, generate reports, and analyze the nutritional value of the food you eat. Diet & Wellness Plus includes over 75,000 foods as well as custom food and recipe features. The Behavior Change Planner helps you identify risks in your life and guides you through the key steps to make positive changes.
- **Global Health Watch.** Bring currency to the classroom with Global Health Watch from Cengage Learning. This user-friendly website provides convenient access to thousands of trusted sources, including academic journals, newspapers, videos, and podcasts, for you to use for research projects or classroom discussion. Global Health Watch is updated daily to offer the most current news about topics related to nutrition.
- **Cognero.** This flexible online system allows the instructor to author, edit, and manage test bank content from multiple Cengage Learning solutions; create multiple test versions in an instant; and deliver tests from an LMS, a classroom, or wherever the instructor wants.
- **Instructor's Companion Site.** Everything you need for your course in one place! This collection of book-specific lecture and class tools is available online via www.cengage.com/login. Access and download PowerPoint presentations, images, instructor's manual, videos, and more.

Brief Author Biographies

Werner W. K. Hoeger is a professor emeritus of the Department of Kinesiology at Boise State University, where he taught between 1986 and 2009. He had previously taught at the University of the Andes in Venezuela (1978–1982); served as Technical Director of the Fitness Monitoring Preventive Medicine Clinic in Rolling Meadows, Illinois (1982–1983); taught at The University of Texas of the Permian Basin in Odessa, Texas (1983–1986); and taught for one semester in 2012, 2013, and 2016 as an adjunct faculty at Brigham Young University Hawaii in Laie, Hawaii. He remains active in research and continues to lecture in the areas of exercise physiology, physical fitness, health, and wellness.

Nancie Battaglia/Getty Images

Dr. Hoeger completed his undergraduate and master's degrees in physical education at the age of 20 and received his doctorate degree with an emphasis in exercise physiology at the age of 24. He is a *Fellow* of the *American College of Sports Medicine* and also of the *Research Consortium* of *SHAPE America (Society of Health and Physical Educators)*. In 2002, he was recognized as the *Outstanding Alumnus* from the *College of Health and Human Performance* at *Brigham Young University.* He is the recipient of the first *Presidential Award for Research and Scholarship* in the *College of Education* at *Boise State University* in 2004.

In 2008, he was asked to be the *keynote speaker* at the *VII Iberoamerican Congress of Sports Medicine and Applied Sciences* in Mérida, Venezuela, and was presented with the *Distinguished Guest of the City* recognition. In 2010, he was also honored as the *keynote speaker* at the *Western Society for Kinesiology and Wellness* in Reno, Nevada.

Using his knowledge and personal experiences, Dr. Hoeger writes engaging, informative books that thoroughly address today's fitness and wellness issues in a format accessible to students. Since 1990, he has been the most widely read fitness and wellness college textbook author in the United States. He has published a total of 65 editions of his nine fitness and wellness-related titles. Among the textbooks written for Cengage Learning are *Lifetime Physical Fitness and Wellness: A Personalized Program,* 15th edition; *Fitness & Wellness,* 13th edition; *Principles and Labs for Physical Fitness,* 10th edition; *Wellness: Guidelines for a Healthy Lifestyle,* 4th edition; and *Water Aerobics for Fitness & Wellness,* 4th edition (with Terry-Ann Spitzer Gibson).

Dr. Hoeger was the first author to write a college fitness textbook that incorporated the wellness concept. In 1986, with the release of the first edition of *Lifetime Physical Fitness and Wellness,* he introduced the principle that to truly improve fitness, health, and quality of life and to achieve wellness, a person needed to go beyond the basic health-related components of physical fitness. His work was so well received that every fitness author in the field immediately followed his lead.

As an innovator in the field, Dr. Hoeger has developed many fitness and wellness assessment tools, including fitness tests such as the Modified Sit-and-Reach, Total Body Rotation, Shoulder Rotation, Muscular Endurance, Muscular Strength and Endurance, and Soda Pop Coordination Tests.

Proving that he "practices what he preaches," he was the oldest male competitor in the 2002 Winter Olympics in Salt Lake City, Utah, at the age of 48. He raced in the sport of luge along with his then 17-year-old son Christopher. It was the first, and so far only time, in Winter Olympics history that father and son competed in the same event. In 2006, at the age of 52, he was the oldest competitor at the Winter Olympics in Turin, Italy. In 2011, Dr. Hoeger raced in the 800-, 1,500-, and 5,000-meter events in track and field at the World Masters Athletic Championships held in Sacramento, California. At different times and in different distances in 2012, 2014, 2015, 2016, and 2018, he reached All-American standards for his age group by USA Track and Field (USATF). In 2015, he finished third in the one-mile run at the USATF Masters Indoor Track and Field National Championships, and third and fourth, respectively, in the 800- and 1,500-meter events at the Outdoor National Senior Games. In 2016, he advanced to the finals in both the 800- and 1,500-meter events at the World Masters Track and Field Championships held in Perth, Australia. He finished seventh (out of 12 finalists) in the 800-meter event and eighth (out of 15 finalists) in the 1,500-meter event.

Sharon A. Hoeger is vice president of Fitness & Wellness, Inc., of Boise, Idaho. Sharon received her degree in computer science from Brigham Young University. In the 1980s, she served as a computer science instructor at the University of Texas of the Permian Basin. She is extensively involved in the research process used in retrieving the

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most current scientific information that goes into the revision of each textbook. She is also the author of the software that was written specifically for the fitness and wellness textbooks. Her innovations in this area since the publication of the first edition of *Lifetime Physical Fitness and Wellness* in 1986 set the standard for fitness and wellness computer software used in this market today.

Sharon is a coauthor of five of the seven fitness and wellness titles. She also served as chef de mission (chief of delegation) for the Venezuelan Olympic Team at the 2006 Winter Olympics in Turin, Italy. A former gymnast, she now participates in a variety of fitness activities to enjoy good health and maintain a high quality of life.

Husband and wife have been jogging and strength training together for more than 42 years. They are the proud parents of five children, all of whom are involved in sports and lifetime fitness activities. Their motto: "Families that exercise together, stay together."

Amber L. Fawson and **Cherie I. Hoeger** received their degrees in English with an emphasis in editing for publication. For the past 17 years Amber has enjoyed working in the publication industry and has held positions as an Editorial Coordinator for *BYU Studies,* Assistant Editor for Cengage Learning, and freelance writer and editor for tertiary education textbooks and workbooks. During the last decade, Cherie has been working as a freelance writer and editor; writing research and marketing copy for client magazines, newsletters, and websites; and contracting as a textbook copy editor for Cengage Learning (previously under Thomson Learning and the Brooks/Cole brand).

Amber and Cherie have taken on a more significant role as coauthors of all fitness and wellness textbooks. Their addition now constitutes an enthusiastic four-person author team to sort through and summarize the extensive literature available in the health, fitness, wellness, and sports medicine fields. Their work has greatly enhanced the excellent quality of these textbooks. They are firm believers in living a health and wellness lifestyle, regularly attend professional meetings in the field, and are active members of the American College of Sports Medicine.

Acknowledgments

The completion of the 15th edition of *Principles and Labs for Fitness and Wellness* was made possible through the contributions of many professionals throughout the country. In particular, we express our gratitude to the reviewers of the 14th edition; their valuable comments and suggestions are sincerely appreciated.

We would like to thank Celeste Brown, Casey and Candice Despain, Jessica Eakins, Gina Jepson, Andrew and Angela Meeter, and Alyssa Woo for their kind help with new photography in this edition.

1

The human body is extremely resilient during youth—not so during middle and older age. The power of prevention, nonetheless, is yours: it enables you to make healthy lifestyle choices today that will prevent disease in the future and increase the quality and length of your life.

Source: Chris Black

Physical Fitness and Wellness

OBJECTIVES

1.1 **Understand** the health and fitness consequences of physical inactivity.

1.2 **Identify** the major health problems in the United States.

1.3 **Learn** how to monitor daily physical activity.

1.4 **Learn** the federal Physical Activity Guidelines for Americans.

1.5 **Define** wellness and list its dimensions.

1.6 **Distinguish** between health fitness standards and physical fitness standards.

1.7 **Define** physical fitness and list health-related and skill-related components.

1.8 **Understand** the benefits and significance of participating in a comprehensive wellness program.

1.9 **Determine** if you can safely initiate an exercise program.

1.10 **Learn** to assess resting heart rate and blood pressure.

FAQ

Why should I take a fitness and wellness course?

Most people go to college to learn how to make a living, but a fitness and wellness course will teach you how to live—how to truly live life to its fullest potential. Some people seem to think that success is measured by how much money they make. Making a good living will not help you unless you live a wellness lifestyle that will allow you to enjoy what you earn. You may want to ask yourself: Of what value are a nice income, a beautiful home, and a solid retirement portfolio if, at age 45, I suffer a massive heart attack that will seriously limit my physical capacity or end life itself?

Is the attainment of good physical fitness sufficient to ensure good health?

Regular participation in a sound physical fitness program will provide substantial health benefits and significantly decrease the risk of many chronic diseases. And although good fitness often motivates toward adoption of additional positive lifestyle behaviors, to maximize the benefits for a healthier, more productive, happier, and longer life, we have to pay attention to all seven dimensions of wellness: physical, social, mental, emotional, occupational, environmental, and spiritual. These dimensions are interrelated, and one frequently affects the other. A wellness way of life requires a constant and deliberate effort to stay healthy and achieve the highest potential for well-being within all dimensions of wellness.

If a person is going to do only one thing to improve health, what should it be?

This is a common question. It is a mistake to think, though, that you can modify just one factor and enjoy wellness. Wellness requires a constant and deliberate effort to change unhealthy behaviors and reinforce healthy behaviors. Although it is difficult to work on many lifestyle changes all at once, being involved in a regular physical activity program, avoiding excessive sitting, observing proper nutrition, and avoiding addictive behaviour are lifestyle factors to work on first. Others should follow, depending on your current lifestyle behaviours.

Real Life Story — Jeremy's Experience

I was a multisport athlete in high school. I played soccer, football, and basketball and ran track. I was not the best athlete on these teams, and I didn't have a chance to make a college team, but I sure loved sports and athletic competition. To earn extra money for college, I worked for a fast-food chain that summer. I was so busy that I didn't do any fitness activities or play sports that summer, and I ate too much junk food, which caused me to gain some weight. Later in college, it took some time to get used to my new surroundings and the newfound freedom from my home life. My friends kept stressing that I needed to enjoy college life as much as possible and not worry so much about academics. We went to a lot of parties and watched sporting events. There was always plenty of alcohol at these activities. I know we drank way too much, we didn't exercise, and my grades suffered as a result. I shouldn't have been so shocked when I saw my final grades. To add insult to injury, it really hit home when I signed up for the fitness and wellness class and found out I had gained more than 15 pounds since high school graduation. My fitness test results showed I was not even in an average fitness category for most components.

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I am so glad the fitness course was a required class, as I was able to correct my lifestyle before it spiraled out of control and I wasted more time in college. I started to exercise on an almost daily basis, and I learned so much about nutrition and healthy eating. Parties and alcohol were no longer important to me. I had a life to live and prepare for. It felt so good to once again become fit and eat a healthy/balanced diet. I rearranged my activities so that schoolwork and fitness were right at the top of my list. I stopped procrastinating on my schoolwork, and I was doing cardio five times a week and lifting twice per week. My goal is to keep this up for the rest of my life. I now understand that if I want to enjoy wellness, I have to make fitness and healthy living a top priority in my life.

Personal Profile General Understanding of Fitness and Wellness

To the best of your ability, answer the following questions. If you do not know the answer(s), this chapter will guide you through them.

1. What have you done to make yourself aware of potential risk factors in your life that may increase your chances of developing disease? What do you know about your family's health history? Is there any other information that you feel you need to know?
2. Do you know the top two leading causes of death in your age group? What steps do you take to protect yourself and set a good example for others?
3. When are you most physically active throughout the day? Is there a season of the year or day of the week when you are most active? What can you do to become more active on a regular basis?
4. Of the seven dimensions of wellness, which dimension do you ignore most? Which dimension do you follow best?
5. What steps are you taking toward financial wellness?

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David Marcu

Exercise is considered to be the much-needed vaccine in our era of widespread chronic diseases.

Do you ever stop to think about factors that influence your actions on a typical day? As you consider typical moments from this past week, which actions were positive and healthy and which may have been negative or harmful? Did you go for a walk or have a conversation with a friend? Did you buy and eat food that you felt good about? Did you pursue a task that held purpose and meaning for you? Conversely, did you battle ongoing stress and anxiety or allow yourself irregular sleep? Did you settle for highly processed food? Did you struggle with relationship problems? Did you regress to previous, unhealthy behaviors?

Take a moment to consider whether the choices from the past week repeated over years would accumulate to promote wellness or to cause disease. Your health is a product of complex, intertwined physical, mental, inherited, and environmental factors that directly influence your state of wellness. This book will help you navigate through these factors that influence your behavior and will provide you with the necessary tools to make changes that are right for your life. We will begin this chapter by looking at the big picture and will then use a personalized approach throughout the book to help you create a program aimed at helping you develop a lifetime fitness and wellness lifestyle.

1.1 The Wellness Challenge for You Today

There are three basic factors that determine our health and longevity: genetics, the environment, and our behavior. In most cases, we cannot change our genetic circumstances, though the budding field of epigenetics is showing us that select genes can be switched on and off by lifestyle choices and environment. (For a more in-depth discussion on epigenetics, see *Epigenetics*, Chapter 12, page 463.) We can certainly, however, exert control over the environment and our health behaviors so that we may reach our full physical potential based on our genetic code (see Figure 1.1).

At the beginning of the 20th century, **life expectancy** for a child born in the United States was only 47 years. The most common health problems in the Western world were infectious diseases, such as tuberculosis, diphtheria, influenza, kidney disease, polio, and other diseases of infancy. Progress in the medical field largely eliminated these diseases. Then, as more people started to enjoy the ease and excesses of modern life, we saw a parallel increase in the incidence of **chronic diseases** such as cardiovascular disease, cancer, diabetes, and chronic respiratory diseases (Figure 1.2).

Figure 1.1 Factors that affect health and longevity.

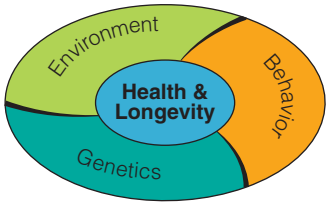
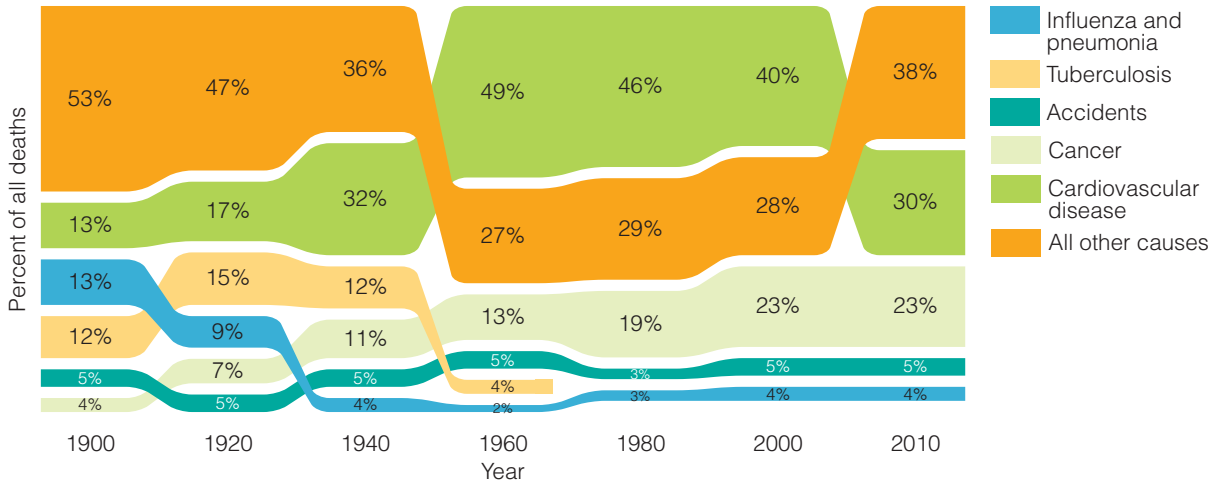


Figure 1.2 Causes of death in the United States for selected years.



Source: National center for Health Statistics, Division of Vital Statistics.

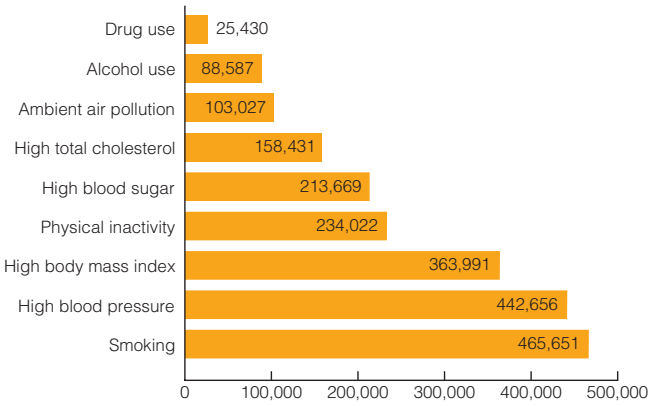
The underlying causes of death attributable to leading **risk factors** in the United States (Figure 1.3) indicate that most factors are related to lifestyle choices we make. The "big five" factors—tobacco smoking, high blood pressure, overweight and obesity, physical inactivity, and high blood glucose—are responsible for almost 1.5 million of the approximately 2.6 million deaths in the United States each year.

Based on estimates, more than half of disease is lifestyle related, a fifth is attributed to the environment, and a tenth is influenced by the health care the individual receives. In fact, worldwide, 20 percent of deaths are linked to poor diet alone.[1] Meanwhile, only 16 percent of disease is related to genetic factors (Figure 1.4). Thus, the individual controls as much as 80 percent of his or her vulnerability to disease—and thus quality of life. In essence, most people in the United States are threatened by the very lives they lead today.

As our culture has adopted the ease of Western life, we have undergone profound cultural shifts at a rapid pace. In comparison, advances in past centuries were slow and gradual. Within the last century, we have made wide-reaching changes like overhauling our diet to include more processed, refined, sugary, and unhealthy fatty foods. We have become increasingly **sedentary**. We have changed our social interactions so that we are now always online or "plugged in." While it is impossible to completely tease out every cultural shift and its impact on health, we know for certain that some take a heavy toll on our population's overall health and wellness. We will begin by examining one of the most impactful cultural shifts. Let's consider the recent history of physical activity.

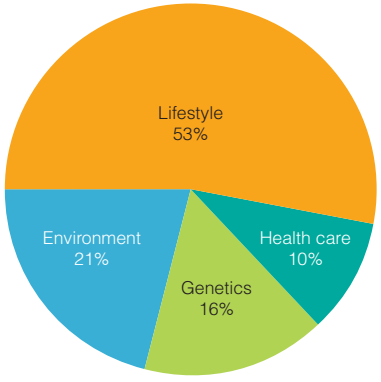
Movement is a basic function for which the human body was created, but advances in technology have almost completely eliminated the necessity for physical exertion in daily life. Scientific findings have shown that physical inactivity and a negative lifestyle seriously threaten health and hasten the deterioration rate of the human body. Most nations, both developed and developing, are experiencing an epidemic of physical inactivity. In the United States, physical inactivity is the second greatest

Figure 1.3 Death from all causes attributable to lifestyle-related risk factors for men and women in the United States.



SOURCE: Institute for Health Metrics and Evaluation News Release, "Dietary Risks Are Leading Cause of Disease Burden in the US and Contributed to More Health Loss in 2010 than Smoking, High Blood Pressure, and High Blood Sugar," July 10, 2013, http://www.healthmetricsandevaluation.org/news-events/news-releases.

Figure 1.4 Estimated impact of the factors that affect health and well-being.



Modern-day conveniences lull people into a sedentary lifestyle.

threat to public health (after tobacco use) and is often referenced in new concerns about *sitting disease,* **sedentary death syndrome (SeDS)**, and **hypokinetic diseases**.

As the populations of the world have adopted a more sedentary lifestyle, the world has seen a steep incline in obesity rates. Before 1980, obesity rates throughout the world remained relatively steady. Then, beginning in the 1980s, obesity rates started to grow rapidly, especially in the United States, Australia, and England. Worldwide, obesity currently claims triple the number of victims as malnutrition. Overweight and obese people are now the majority in the 34 countries that make up the Organization for Economic Cooperation and Development (OECD).

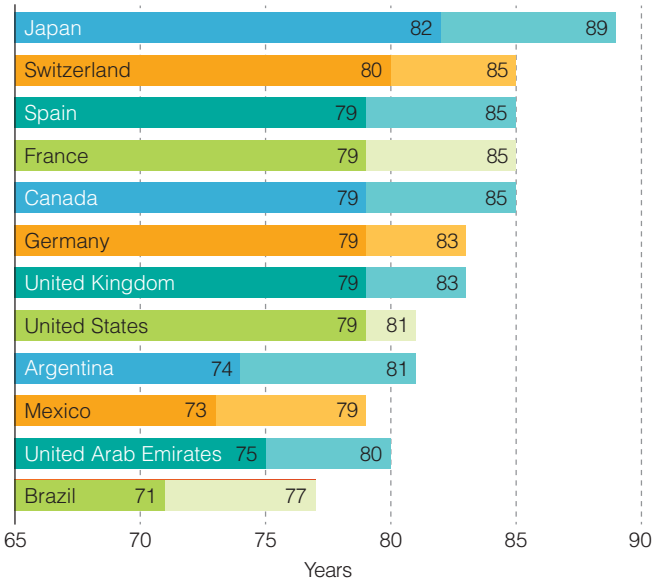
Around the same time that incidence of chronic diseases climbed, we recognized that prevention is the best medicine. Consequently, a fitness and wellness movement developed gradually, beginning in the 1980s. Gyms and fitness centers as we know them began to be common across the country. People began to realize that good health is mostly self-controlled and that the leading causes of premature death and illness can be prevented by adhering to positive lifestyle habits.

Widespread interest in **health** and preventive medicine in recent years is motivating people to reexamine the foods they eat, incorporate more movement into activities of daily life, participate in organized fitness and wellness programs, and seek to reduce stress and increase well-being. We all desire to live a long life, and wellness programs aim to enhance the overall quality of life—for as long as we live.

1.2 Life Expectancy

Currently, the average life expectancy in the United States is 78.8 years (76.3 years for men and 81.2 years for women).[2] In the past decade alone, life expectancy has increased by 2 years. The news, however, is not all good: the data show that people now spend an extra 1.2 years with a serious illness and endure an extra 2 years of disability. Mortality has been postponed because medical treatments allow people to live longer with chronic ailments.

Figure 1.5 Life expectancy at birth for selected countries: 2005–2015 projections.



Dark color is men; light color is women.

SOURCE: Central Intelligence Agency, "The World Factbook" 2017 estimated, https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html

While the United States was once a world leader in life expectancy, over recent years, the increase in life expectancy in the United States has not kept pace with that of other developed countries. Based on data from the World Health Organization (WHO), the United States ranks 31st in the world for life expectancy (see Figure 1.5).[3] Japan ranks first in the world with an overall life expectancy of 85.3 years.[4] Countries like South Korea are making quick climbs in life expectancy because few members of the population are obese, few smoke, and average blood pressure remains low.

GLOSSARY

Life expectancy Number of years a person is expected to live based on the person's birth year.

Chronic diseases Illnesses that develop as a result of an unhealthy lifestyle and last a long time.

Risk factors Lifestyle and genetic variables that may lead to disease.

Sedentary Description of a person who is relatively inactive and whose lifestyle is characterized by a lot of sitting.

Sedentary death syndrome (SeDS) Cause of deaths attributed to a lack of regular physical activity.

Hypokinetic diseases *Hypo* denotes "lack of"; therefore, illnesses related to lack of physical activity.

Health State of complete well-being—not just the absence of disease or infirmity.

Several factors may account for the current U.S. life expectancy ranking, including the extremely poor health of some groups. The United States also has fairly high levels of violence (notably, homicides), rates of traffic fatalities, and suicide rates.[5] The current trend is a widening disparity between those in the United States with the highest and lowest life expectancy. For example, males in Fairfax County, Virginia, can expect to live as long as males in Japan, while those in Bolivar County, Mississippi, have the same life expectancy as males in countries with much lower life expectancies, like Pakistan. People with low socioeconomic status often lead more stressful lives, have more dangerous jobs, have less access to healthy food, are more likely to be exposed to environmental toxins, and live in neighborhoods that are not as safe or as conducive to physical activity.[6] In additon to having lower life expectancy, people with low socioeconimc status spend more of their final years in disability. A healthy lifestyle, on average, adds 5 to 6 years of disability-free life.[7]

The Gender Gap in Life Expectancy

Life expectancy for men in the United States is almost 5 years lower than for women. For years it had been assumed that the difference is based on biology, but we are learning that most likely the gender gap is related to lifestyle behaviors most commonly observed in men. Around 1980, the gender gap in life expectancy was almost 8 years. The decrease in the gender gap is thought to be due to the fact that women are increasingly taking on jobs, habits, and stressors of men, including drinking and employment outside the home. Women with heavy work schedules, however, are at higher risk than men who have similar work schedules when it comes to heart disease, cancer, and diabetes—most likely because women tend to take on additional stressors at home.[8] Women and men are also becoming more similar to one another in their risk factors for heart disease, such as obesity and diabetes.

Men, nonetheless, still report higher stress on the job and are less likely to engage in stress management programs. Also, 95 percent of employees in the 10 most dangerous jobs are men. Furthermore, men's health is not given the same degree of attention in terms of public health policies. Thus, men need to take a more proactive role in managing their own health, yet, unfortunately, this can be hard for them.

"Masculinity" itself is also partially to blame. Studies have consistently shown that men are less likely to visit a physician when something is wrong and are less likely to have preventive care visits to be screened for potential risk factors such as hypertension, elevated cholesterol, diabetes, obesity, substance abuse, and depression or anxiety. It is a troubling paradox, considering that men are at greater risk for each of the top risk factors for chronic disease. As a result, chronic diseases in men are often diagnosed at a later stage, when a cure or adequate management is more difficult to achieve. Men also drive faster than women and are more likely to engage in risk-taking activities.

The Need to Prevent Disease, Not Only Cure It

The United States has not invested the same resources in preventing disease as it has in treating disease after onset. Ninety-five percent of our health care dollars are spent on treatment strategies, and less than 5 percent are spent on prevention. In contrast, some countries, like Australia, have boosted prevention efforts by arranging primary care to better detect and intervene with hypertension, for example. The latest data indicate that one in four adults in the United States have at least two chronic conditions. Most of these patients do not receive half of the preventative measures recommended by the U.S. Preventative Services Task Force. Eva H. DuGoff of Johns Hopkins Bloomberg School of Public Health has said, "Our system is not set up to care for people with so many different illnesses. Each one adds up and makes the burden of disease greater than the sum of its parts."[9]

A report by the OECD found that while the United States far outspent every other country in health care cost per capita, it also easily had the highest rates of obesity of all 34 OECD countries.[10] As a nation, we are seeing the consequences of these numbers unfold. Incidence of diabetes climbed dramatically in parallel step with the increased incidence of obesity.[11] Today, nearly half of the people in the United States have diabetes or prediabetes.[12] Thankfully, the rising U.S. diabetes rates have begun to plateau, as obesity rates have done the same. Diabetes is the third most expensive chronic disease to treat, preceded only by heart disease and hypertension, respectively. All three of these chronic conditions are linked with obesity.[13] Additional information on the obesity epidemic and its detrimental health consequences is given in Chapter 5.

1.3 Leading Health Problems in the United States

The leading causes of death in the United States today are largely related to lifestyle and personal choices (Figure 1.6). The U.S. Centers for Disease Control and Prevention (CDC) have found that 7 of 10 Americans die of preventable chronic diseases. Specifically, about 48 percent of all deaths in the United States are caused by cardiovascular disease and cancer.[14] The third and fourth leading causes of death across all age groups, respectively, are chronic lower respiratory disease and accidents. From the age of 1 to 44, accidents are the leading cause of death, with automobile accidents being the leading cause of death in the 5 to 24 age group.[15]

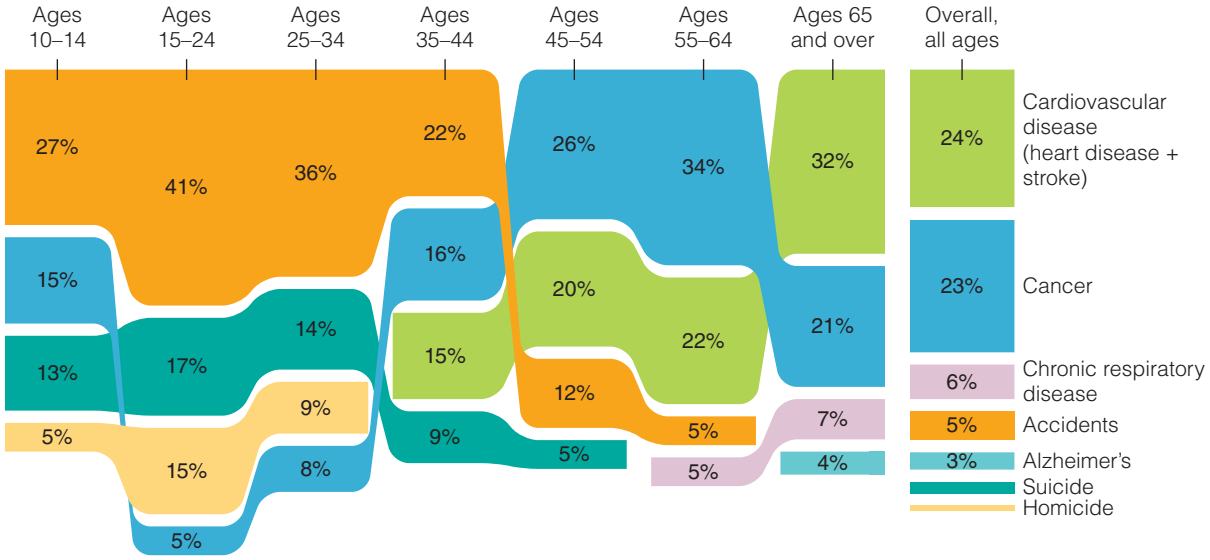
Hoeger Key To Wellness

Scientists believe that a healthy lifestyle program has the power to prevent almost 80 percent of deaths from cardiovascular disease and cancer.

Diseases of the Cardiovascular System

The most prevalent degenerative diseases in the United States are those of the cardiovascular system. The umbrella of **cardiovascular diseases** includes such conditions as **coronary heart disease**

Figure 1.6 Leading causes of death in the United States by age.



SOURCE: Centers for Disease Control and Prevention, "Deaths, Final Data, 2014."

Healthy Habits That Cut the Risk for Serious Disease

According to the Centers for Disease Control and Prevention, four health habits can reduce your risk of chronic diseases such as heart disease, cancer, and diabetes by almost 80 percent:

- Get at least 30 minutes of daily moderate-intensity physical activity.
- Don't ever smoke.
- Eat a healthy diet (ample fruits and vegetables, whole grain products, and low meat consumption).
- Maintain a body mass index (BMI) of less than 30.

The latest research would add one more crucial life-saving habit: Reduce the amount of time you spend sitting each day.

(CHD), **heart attacks**, and **strokes** (sometimes referred to as brain attacks because, like heart attacks, strokes occur when oxygen-rich blood is blocked from reaching cells). According to the American Heart Association (AHA), more than one in three adults in the United States is afflicted with diseases of the cardiovascular system, including hypertension (high blood pressure) and CHD. These numbers are devastating but can change. As we gained understanding of the effects of lifestyle on chronic disease starting in 1963, more people participated in wellness programs, and cardiovascular mortality rates dropped. A complete cardiovascular disease prevention program is outlined in Chapter 11.

Cancer

The second overall leading cause of death in the United States is cancer. Cancer is closing the gap to soon become the leading cause of death in the United States. For Americans ages 45 to 64 nationwide, as well as for certain ethnic groups,[16] it is already the leading cause of death. One reason for this change may be that increased rates of obesity lead to increased risk for both cancer and

GLOSSARY

Cardiovascular disease The array of conditions that affect the heart (cardio-) and the blood vessels (-vascular); often used interchangeably with the term *heart disease*. Under the cardiovascular disease umbrella are diseases including stroke and coronary heart disease (CHD). CHD, in turn, is an umbrella term for diseases that affect the heart and coronary arteries, which includes heart attacks.

Coronary heart disease (CHD) A disease in which plaque builds up in the arteries that supply blood to the heart (these are the coronary arteries; the term "coronary" evolved from the word for "crown or wreath," referring to the arteries that circle the heart).

Heart attack Damage to an area of the myocardium (heart muscle) that is deprived of oxygen, usually due to blockage of a diseased coronary artery.

Stroke A condition in which a blood vessel that feeds the brain is clogged, leading to blood flow disruption to the brain. Sometimes referred to as a brain attack.

cardiovascular disease, but treatment for cardiovascular disease is not as difficult and complex as cancer treatment. About 23 percent of all deaths in the United States are attributable to cancer.[17]

The major contributor to the increase in the incidence of cancer deaths during the past five decades is smoking, which accounts for almost 30 percent of all deaths from cancer. More than 30 percent of deaths are related to nutrition, physical inactivity, excessive body weight, and other faulty lifestyle habits.

The American Cancer Society maintains that the most influential factor in fighting cancer today is prevention through health education programs. Lifestyle choices at a young age affect cancer risk throughout a lifetime. A comprehensive cancer-prevention program is presented in Chapter 12.

Chronic Lower Respiratory Disease

Chronic lower respiratory disease (CLRD), the third leading cause of death, is a general term that includes chronic obstructive pulmonary disease, emphysema, and chronic bronchitis (all diseases of the respiratory system). Although CLRD is related mostly to tobacco use (see Chapter 13 for discussion on how to stop smoking), lifetime nonsmokers also can develop CLRD.

Precautions to prevent CLRD include consuming a low-fat, low-sodium, nutrient-dense diet; staying physically active; not smoking and not breathing cigarette smoke; getting a pneumonia vaccine if older than age 50 and a current or ex-smoker; and avoiding swimming pools if sensitive to chlorine vapor.

Accidents

Accidents are the fourth overall leading cause of death and the leading cause of death until age 44. Even though not all accidents are preventable, many are. Consider automobile accidents, the leading cause of death for teens. Across the United States, fewer than 15 percent of people taking trips in automobiles choose not to wear seatbelts, yet these people account for half of all automobile deaths. As for the cause of automobile accidents themselves, fatal accidents are often related to failure to stay in the correct lane or yield the right of way due to driver distraction or alcohol use.[18] Pedestrian deaths are another example of preventable accidents. Over one-third of pedestrian deaths occur because the pedestrian had a blood-alcohol level that was over the legal limit for driving. And almost half of the deaths occurred because either the driver or pedestrian were above the legal blood-alcohol level. [19]

Most people do not perceive accidents as a health problem. Even so, accidents affect the total well-being of millions of Americans each year. Accident prevention and personal safety are part of a health-enhancement program aimed at achieving a better quality of life. Hours spent exercising at the gym are of little help if the person is involved in a disabling or fatal accident as a result of distraction or making a single reckless decision.

Accidents do not just happen. We cause accidents, and we are victims of accidents. Although some factors in life, like natural disasters, are completely beyond our control, more often than not, personal safety and accident prevention are a matter of common sense. Most accidents stem from poor judgment and confused mental states, which occur when people are upset, mentally spent, not paying attention to the task at hand, trying to do too much at once, or abusing alcohol or other drugs.

With the advent of cell phones, distracted driving accidents have climbed. For teens, specifically, 6 in 10 of all moderate to severe automobile accidents result from driver distraction.[20] As the Senior Director of Transportation Strategic Initiatives for the National Safety Council, David Teater, put it, "You never think it will happen to you—until it does." Teater's research has been motivated by the loss of his 12-year-old son in a cell phone–related accident. Research utilizing brain imaging has uncovered the cognitive workload and collision risk during multiple driving scenarios (see *Distracted Driving* on page 9).

Alcohol abuse is the number-one overall cause of all accidents. About half of accidental deaths and suicides in the United States are alcohol related. Further, alcohol intoxication remains the leading cause of fatal automobile accidents in the United States by taking the lives of 30 people every day. Other commonly abused drugs alter feelings and perceptions, generate mental confusion, and impair judgment and coordination, greatly enhancing the risk for accidental **morbidity** (Chapter 13).

Medical Error in U.S. Hospitals: An Untracked Mortality Risk

Only recently has attention been brought to the number of deaths that are a direct result of medical error in U.S. hospitals. When cause of death is recorded by the CDC, medical error is not offered as an option; however, an estimated 250,000 deaths each year are the result of a mistake of omission or commission by medical workers. While nothing can guarantee perfect medical care, it is ideal for every hospitalized patient to have an attentive and vocal advocate, and of course to lead a wellness lifestyle to avoid preventable health complications in the first place.

1.4 Physical Activity Affects Health and Quality of Life

Among the benefits of regular physical activity and exercise are a significant reduction in premature mortality and decreased risks for developing heart disease, stroke, metabolic syndrome, type 2 diabetes, obesity, osteoporosis, colon and breast cancers, high blood pressure, depression, and even dementia and Alzheimer's. But we did not always understand the relationship between physical activity and mortality rates—in particular, the dose–response relationship.

During the second half of the 20th century, scientists began to realize the importance of good fitness and improved lifestyle in the fight against chronic diseases, particularly those of the cardiovascular system. Because of more participation in wellness programs, cardiovascular mortality rates dropped.

GLOSSARY

Morbidity A condition related to or caused by illness or disease.

Distracted Driving

Automobile accidents are the number-one cause of death for teens in the United States. Recent studies on distracted driving have used new technology, including real-time brain imaging, to offer new insight about protecting ourselves behind the wheel. Following are insights for drivers.

1. *Listening to the radio is nearly as safe as driving with no distractions.*
2. *Having a cell phone conversation increases collision incidence fourfold.* The risk is identical for a hands-free device and a hand-held phone.[a]
3. *Having a cell phone conversation causes the brain to screen out 50 percent of visual cues*. The ability to look directly at but not "see" an object is termed "inattention blindness." It is not uncommon for a distracted driver running a red light to collide with the second or third car in an intersection, having not "seen" the first cars. Talking on a phone while driving decreases reaction time to pedestrians in a crosswalk by 40 percent.[b]
4. *Having a conversation with an adult passenger is safer than having a conversation on a cell phone*. Passengers who are experienced drivers help the driver by pausing conversation and by pointing out cues as needed. For a teen driver, the incidence of collision resulting in death increases with the number of teen passengers.
5. *Though crash risk is lower when talking with a passenger, cognitive workload can be the same as when talking on a cell phone*. Topic of conversation and emotional involvement affect safety in both types of conversation.
6. *The brain does not multitask, but rather switches attention between tasks*. Some dual tasks do not cause a problem; others do. When driving and holding a conversation, the brain often recognizes conversation as the primary task. Switching is a complex process that requires events to be committed to short-term memory before they can be "encoded," the stage when the brain chooses what to "see." It is not uncommon for switching time to be tenths of a second, the difference of several car lengths when braking. This is termed "reaction time switching costs."
7. *The brain remains somewhat distracted for up to 27 seconds following a phone conversation, text, or voice technology interaction*.[c]
8. *Because the majority of trips do not involve a situation that requires split-second timing, drivers can gain a false sense of security about being able to multitask*.
9. *Making a left turn while talking on a cell phone or hands-free device is among the most dangerous driving activities*.[d]
10. *Reaching for a moving object or turning in your seat increases collision incidence by eight to nine times*.
11. *Texting while driving increases collision incidence by 16 times*. Talking is the cause of more deaths than texting because, compared with texting, drivers talk on a cell phone more frequently for longer lengths of time. Consider using your phone's "do not disturb" setting or an app that blocks texting while driving. Because our minds are social and curious, we find text alerts difficult to ignore. Pedestrians who are distracted by their phones also increase their chances of being a victim of a fatal car accident.

AAA Foundation for Traffic Safety

12. *Sleepy drivers kill more than half as many Americans as drunk drivers*. More than 6,000 people die each year in the United States in crashes attributed to drowsy drivers. A person who gets 5 hours of sleep is twice as likely to cause an accident as a person who gets 7 hours, while a person who gets less than 4 hours of sleep is twelve times as likely to cause an acident.[e] In comparison, roughly 10,000 people die each year because of drunk or buzzed driving.
13. *Parents driving children are just as likely to talk on the phone and use distractions, including navigation systems, as other drivers*.[f]
14. *Using Apple's Siri while driving to get directions, send texts, post to social media, or check appointments can be as dangerous as texting while driving, even when using hands-free*.[g]

We cannot control what information our brain chooses to encode and screen out while driving. We can control our decision to use a cell phone or to speak up when a driver is putting passengers in danger.

[a] Training, Research, and Education for Driving Safety, "UC San Diego Joins Nationwide Efforts to Curb Phone Use While Driving," released online December 4, 2013, available at http://health.ucsd.edu/news/releases/Pages/2013-12-04-TREDS-just-drive-program.aspx; J. G. Gaspar, W. M. Street, M. B. Windsor, R. Carbonari, H. Kaczmarski, A. F. Kramer, and K. E. Mathewson, "Providing Conversation Partners Views of the Driving Scene Mitigates Cell Phone-Related Distraction," *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 57, no. 1 (2013).

[b] Jill U. Adams, "Talking on a Cellphone While Driving Is Risky. But simpler Distractions Can Also Cause Harm," *Washington Post*, February 10, 2014.

[c] "Up to 27 Seconds of Inattention after Talking to Your Car or Smartphone," The University of Utah UNews, October 27, 2015, available at http://unews.utah.edu/up-to-27-seconds-of-inattention-after-talking-to-your-car-or-smart-phone/.

[d] Tom A. Schweizer, Karen Kan, Yuwen Hung, Fred Tarn, Gary Naglie, and Simon J. Graham, "Brain Activity during Driving with Distraction: An Immersive fMRI Study," *Frontiers in Human Neuroscience*, February 28, 2013, doi:10.3389/fnhum.2013.00053.

[e] AAA Foundation for Traffic Safety, "Prevalence of Drowsy-Driving Crashes: Estimates from a Large-Scale Naturalistic Driving Study," February 18, 2018, available at https://publicaffairsresources.aaa.biz/wp-content/uploads/dlm_uploads/2018/01/FINAL_AAAFTS-Drowsy-Driving-Research-Brief.pdf.

[f] Michelle L. Macy, Patrick M. Carter, C. Raymond Bingham, Rebecca M. Cunningham, and Gary L. Freed, "Potential Distractions and Unsafe Driving Behaviors Among Drivers of 1- to 12-Year-Old Children," *Academic Pediatrics* 14, no. 3 (2014): 279.

[g] University of Utah News Center, "Talking to Your Car Is Often Distracting," October 7, 2014, available online at http://unews.utah.edu/news_releases/talking-to-your-car-is-often-distracting/.