

# *Lifetime Physical Fitness & Wellness*

*A PERSONALIZED PROGRAM*

*14TH EDITION*



WERNER W. K. HOEGER • SHARON A. HOEGER  
CHERIE I. HOEGER • AMBER L. FAWSON

14th  
EDITION

# *Lifetime Physical Fitness & Wellness*

*A Personalized Program*

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# Preface

The American lifestyle does not provide the human body with sufficient physical activity to enhance or maintain adequate health. In reality, 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 mortality.

People in the United States say they believe that physical activity and positive lifestyle habits promote better health, but most do not reap these benefits because they simply do not know how to implement and maintain a sound physical fitness and wellness program that will yield the desired results. About one-half of the adults in the United States do not achieve the recommended daily amount of aerobic activity and an ever lower amount meet the guidelines for muscular (strength) fitness, thereby placing themselves at risk for premature morbidity and early death.

Furthermore, the energy (caloric) expenditure that used to result from activities other than planned daily exercise and basic body functions has also substantially decreased during the last century (known as nonexercise activity thermogenesis or NEAT). Examples of these activities include standing and walking while performing tasks, yard work, housecleaning, gardening, taking stairs, walking to and from stores or offices, or using a bicycle as the primary mode of transportation, and so on. NEAT used to represent a major portion of daily energy expenditure. This overall decline in physical activity accelerates aging, obesity, and loss of physical function, and further contributes to the development of chronic disease and premature mortality.

A regular exercise program is as close as we get to the miracle pill that people look for to enjoy good health and quality of life over a now longer lifespan. Myriad benefits of exercise include enhanced functional capacity; increased energy; weight loss; improved mood, self-esteem, and physical appearance; and decreased risk for many chronic ailments, including obesity, cardiovascular disease, cancer, and diabetes. As stated as far back as 1982 in the prestigious *Journal of the American Medical Association*, “There is no drug in current or prospective use that holds as much promise for sustained health as a lifetime program of physical exercise.”

The benefits of exercise along with healthy lifestyle habits are only reaped through action. 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.

Many of the behaviors we adopt are a product of our environment and value system. Unfortunately, we live in a “toxic” health/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 it influences our behaviors, personal lifestyle, and health every day. As you study and assess physical fitness and wellness parameters, you will need to take a critical look at your behaviors and lifestyle—and most likely make selected lifetime changes to promote overall health and wellness. As you understand and live the concepts presented in this book, your value system will change and you’ll be prepared to embark on a lifetime physical fitness and wellness journey.

The book is organized in the most efficient manner possible for students to derive the greatest benefit from its contents. Each chapter starts with the chapter objectives, followed by *Frequently Asked Questions (FAQ)* and *Real Life Stories* that will pique the students’ interest in the chapter’s topic. The chapter contents are presented next, with extensive use of graphs, charts, tables, activities, critical thinking questions, keys to wellness, informational boxes, behavior modification boxes, definitions of key terms, and photographs to maximize student learning, content retention, and motivation for healthy lifetime behavioral change. As no other textbook, the Hoegers’ *Fitness & Wellness* series makes exceptional use of these special pedagogical aids and high-interest features.

A unique feature of *Lifetime Physical Fitness & Wellness* is the activity experiences provided as key information is addressed in each chapter. These activities allow each student to develop *A Personalized Program* according to individual needs. All chapters highlight key wellness concepts throughout the text and conclude with *Assess Your Behavior* and *Assess Your Knowledge* sections so that students may evaluate the impact of the subject matter on their personal lifestyle and their understanding of the chapter contents through 10 multiple-choice questions.

Scientific evidence has clearly shown that improving the quality—and most likely the longevity—of our lives is a matter of personal choice. The biggest challenge we face in the 21st century is to learn how to take control of our personal health habits to ensure a better, healthier, happier, and more productive life. The information presented in this book has been written with this goal in mind and provides the student with the necessary tools and guidelines to implement and adhere to a *Lifetime Physical Fitness and Wellness Program*. The emphasis throughout the book is on teaching the students how to take control of their personal lifestyle habits so that they can do what is necessary to stay healthy and realize their highest potential for well being.

## New in the 14th Edition

All 15 chapters in the 14th edition of *Lifetime Physical Fitness & Wellness: A Personalized Program* 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 selected new photography, figures, and keys to wellness and insert boxes, the following are the most significant changes to this edition.

### Chapter Updates

#### Chapter 1, Physical Fitness and Wellness

- An expanded section on *Sitting Disease*, a 21<sup>st</sup> century ailment coined by the scientific community to explain the detrimental effects of excessive sitting
- Reorganization of chapter material to better highlight the importance of daily physical activity and nonexercise thermogenesis (NEAT)
- Updated information about exercise as a preventative health measure and its effectiveness as a treatment modality as compared to drug treatments
- A new feature box outlining the latest research on distracted driving accidents and the cognitive processes behind a variety of driving scenarios
- New data regarding exercise and brain function, including the role of exercise to combat cognitive decline and Alzheimer's disease
- Exploration of the causes behind the U.S.'s lagging life expectancy
- A new section highlighting activity tracker options

#### Chapter 2, Behavior Modification

- A new section on *Values and Behavior* that explains the way core values are formed with new information on the role of the prefrontal cortex of the brain in carrying out value-centered behavior
- Updated and expanded information about the brain and habit formation
- An introduction to mindfulness and willpower and their role in goal achievement
- Updated statistics about the negative effects of a sedentary lifestyle and our food-abundant environment

#### Chapter 3, Nutrition for Wellness

- Editorial changes throughout the chapter to update nutrition concepts based on the most current research and reports in the field
- New evidence on the detrimental effects of excessive sugar in the diet and the effects of liquid calories on health and weight control

- A broadened discussion on the concept of chronic and acute inflammation and the role of nutrition in its prevention
- New content about the current recommendations for saturated fat replacement in the diet for cardiovascular disease prevention
- Additional information on the key role of adequate protein intake throughout the day for health and weight management
- New updates on nutrient supplements, including Vitamin D supplementation

#### Chapter 4, Body Composition

- New global recommendations for health metrics, including a discussion of the way waist circumference, waist-to-height-ratio (WHtR), and BMI are being used in conjunction to prevent disease
- Expanded discussion on WHtR and the way it is used to more accurately predict disease in public health measures

#### Chapter 5, Weight Management

- Updated data on the obesity epidemic in the United States
- Recommendations for preventing the dreaded “Freshman 15” weight gain syndrome
- New information about EDNOS (Eating Disorders Not Otherwise Specified) and the Federal Trade Commission's Weight-Loss Gimmick “7 Gut Check Claims”
- A discussion on the rate of weight loss in men vs. women
- The latest information about light exposure and BMI
- A discussion on the role of strength training on visceral fat loss
- An enhanced section on the importance of proper caloric distribution throughout the day for adequate weight management
- Additional suggestions for weight-loss strategies

#### Chapter 6, Cardiorespiratory Endurance

- Updates on the benefits of aerobic exercise, an adequate cool-down phase following aerobic exercise, and the health consequences of physical stillness (sitting disease)
- The latest recommendations for a suitable rate of training progression for individuals suffering from chronic diseases

#### Chapter 7, Muscular Fitness

- Enhancements to the content on training order (aerobic vs. strength training), on aging and sarcopenia, and on sufficient protein intake for young and older adults
- Expanded information about timing, dose, and type of protein intake
- An updated discussion on strength training and visceral fat
- An introduction to the concepts of myofibrillar and plasmic hypertrophy

## Chapter 8, Muscular Flexibility

- New figure listing ergonomic tips to improve the computer workspace, provide optimal lower back support, and ensure correct sitting posture while working at a desk
- New tips to prevent the instance of “text neck” symptoms that stem from the overuse of smartphones and other mobile devices
- Expanded section on preventing and rehabilitating low back pain to include the importance of core-strengthening exercises

## Chapter 9, Comprehensive Fitness Programming

- Expanded information on high intensity interval training (HIIT) and its wide range of applications for peak performers, new exercisers, and patients of chronic illness alike
- Discussions of new fitness trends in areas including functional fitness, HIIT, high-intensity circuit training (HICT), outdoor training, cross training, and senior fitness solutions including tai chi
- New updated information about the “runner’s high”

## Chapter 10, Preventing Cardiovascular Disease

- Up-to-date data on the prevalence of cardiovascular disease
- New information provided throughout the chapter, including the role of dietary cholesterol, saturated fat, and refined carbohydrates on heart disease risk; trans fat and cardiovascular disease; medication use and exercise; the PLAC blood test for heart disease and genetic testing for heart disease; exercise and type 2 diabetes; stress and CHD; and high blood pressure as a risk factor for CHD
- Thorough discussion about the recently released heart disease and stroke prevention guidelines by the American Heart Association and the American College of Cardiology

## Chapter 11, Cancer Prevention

- New information detailing the way cancer develops at the cellular level to help students better understand the cause and effect of cancer risk and prevention
- A review of innovative breakthroughs regarding telomeres and their role in cancer and aging
- A new section about genetic vs. environmental influences on cancer risk
- An introduction to the field of epigenetics, with a biological explanation of the epigenome and a discussion of how lifestyle choices turn certain genes on or off, changing their expression
- Practical, day-to-day suggestions for avoiding cancer risk added throughout
- Updated data on the incidence and mortality rates of cancer, along with the most common site-specific cancer risk factors

## Chapter 12, Stress Assessment and Management Techniques

- New section on the damaging role of “technostress” in today’s technology-dependent age, including tips on managing tech-related stress at home, at school, and in the work place
- New information on the importance of proper breathing as a natural mechanism to reduce stress
- Expanded information on the benefits of mindfulness meditation, tai chi, and yoga for stress management

## Chapter 13, Addictive Behavior

- 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
- New section describing the alarming spread of what the Commission on Narcotic Drugs has termed new psychoactive substances (NPS), also known as “designer” or “synthetic” drugs
- Enhanced section on synthetic cannabinoids (known as synthetic marijuana or Spice) which are the most prevalent NPS in the United States
- Discussions of recent trends in illicit drug use, energy drink consumption, and e-cigarette use have been updated and expanded

## Chapter 14, Preventing Sexually Transmitted Infections

- New content is presented on the prevalence and prevention of Hepatitis B as an STI
- Expanded introductory information detailing the types and causes of the eight most common STIs and whether they are curable or treatable
- The most recent findings in the success of antiretroviral therapy in the suppression of the HIV virus in infected patients
- Current data 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)

## Chapter 15, Lifetime Fitness and Wellness

- New information on the growing trend of integrative medicine in hospitals, practices, and treatment centers
- Expanded guidelines for choosing a personal fitness trainer
- Updated resources where students can access credible research on health and wellness topics
- New data graph illustrating the prevalence of various types of complementary and alternative medicine (CAM) in the United States



## Additional Course Resources

- **Health MindTap for Lifetime Physical Fitness & Wellness.** Instant Access Code, ISBN-13: 9781305869943. MindTap is well beyond an e-Book, a homework solution or digital supplement, a resource center website, a course delivery platform, or a learning management system. More than 70 percent of students surveyed said it was unlike anything they have seen before. MindTap is a new personal learning experience that combines all your digital assets—readings, multimedia, activities, and assessments—into a singular learning path to improve student outcomes.
- **Diet & Wellness Plus.** The Diet & Wellness Plus App in MindTap helps you gain a better understanding of how nutrition relates to your personal health goals. It enables you to track your diet and activity, generate reports, and analyze the nutritional value of the food you eat! It includes more than 55,000 foods in the database, custom food and recipe features, and the latest dietary references, as well as your goal and actual percentages of essential nutrients, vitamins, and minerals. It also helps you to identify a problem behavior and make a positive change. After completing a wellness profile questionnaire, Diet & Wellness Plus will rate the level of concern for eight different areas of wellness, helping you determine the areas where you are most at risk. It then helps you put together a plan for positive change by helping you select a goal to work toward—complete with a reward for all your hard work. The Diet & Wellness Plus App is accessed from the App dock in MindTap and can be used throughout the course for students to track their diet and activity and behavior change. There are activities and labs in the course that have students access the App to further extend learning and integrate course content.
- **Instructor Companion Site.** Everything you need for your course in one place! This collection of book-specific lecture and class tools is available online via <http://www.cengage.com/login>. Access and download PowerPoint presentations, images, an instructor’s manual, videos, and more.
- **Cengage Learning Testing Powered by Cognero.** Cengage Learning Testing Powered by Cognero is a flexible, online system that allows you to:
  - author, edit, and manage test bank content from multiple Cengage Learning solutions
  - create multiple test versions in an instant
  - deliver tests from your LMS, your classroom, or wherever you want
- **Global Health Watch.** Instant Access Code, ISBN-13: 9781111377335. Printed Access Card, ISBN-13: 9781111377311. Updated with today’s current headlines, Global Health Watch is your one-stop resource for classroom discussion and research projects. This resource

center provides access to thousands of trusted health sources, including academic journals, magazines, newspapers, videos, podcasts, and more. It is updated daily to offer the most current news about topics related to your health course.

- **Behavior Change Workbook.** ISBN-13: 9780495011453. The Behavior Change Workbook includes a brief discussion of the current theories behind making positive lifestyle changes along with exercises to help students make these changes in their everyday lives.
- **Careers in Health, Physical Education, and Sports, 2e.** ISBN-13: 9780495388395. This unique booklet takes students through the complicated process of picking the type of career they want to pursue; explains how to prepare for the transition into the working world; and provides insight into different career paths, education requirements, and reasonable salary expectations. A designated chapter discusses some of the legal issues that surround the workplace, including discrimination and harassment. This supplement is complete with personal development activities designed to encourage students to focus on and develop better insight into their futures.
- **Readings for a Healthy Living.** ISBN-13: 9780759359444. This reader features twelve articles written by author Dianne Hales and published in *PARADE* magazine. Readings include “Take Your Meds—The Right Way,” “You Can Think Yourself Thin,” “Getting Yourself Back on Track,” “Too Tough to Seek Help,” and “The Best Medical Help Online.”

## Brief Author Biographies

**Werner W.K. Hoeger** is a Professor Emeritus of the Department of Kinesiology at Boise State University. He remains active in research and continues to lecture in the areas of exercise physiology, physical fitness, health, and wellness.

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 Iboamerican 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.

Dr. Hoeger uses his knowledge and personal experiences to write 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 62 editions of his 9 fitness and wellness-related titles. Among the textbooks written for Cengage Learning are *Principles and Labs for Fitness and Wellness*, thirteenth edition; *Fitness and Wellness*, twelfth edition; *Principles and Labs for Physical Fitness*, tenth edition; *Wellness: Guidelines for a Healthy Lifestyle*, fourth edition; and *Water Aerobics for Fitness and Wellness*, fourth 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 & 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 immediately followed his lead.



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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, and 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



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2012, 2013, 2014, and 2015, 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-meters at the Outdoor National Senior Games.

**Sharon A. Hoeger** is Vice-President of Fitness & Wellness, Inc. of Boise, Idaho. Sharon received her degree in computer science from Brigham Young University. She is extensively involved in the research process used in retrieving the most current scientific information that goes into the revision of each textbook. She is also the author of the software written specifically for the fitness and wellness textbooks. Her innovations in this area since the publication of the first edition of *Lifetime Physical Fitness & Wellness* set the standard for fitness and wellness computer software used in this market today.

Sharon is a co-author in five of the seven fitness and wellness titles. She also served as



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Chef de Mission (Chief of Delegation) for the Venezuelan Olympic Team at the 2006 Olympic Winter Games in Turin, Italy. Husband and wife have been jogging and strength training together for more than 38 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 15 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 been working for Fitness & Wellness, Inc. for several years and have now taken on a more significant role with the research, updates, and writing of the new editions. There is now a four-person 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 healthy lifestyle, they regularly attend professional meetings in the field, and they are active members of the American College of Sports Medicine.



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## Acknowledgments

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The completion of the 14th edition of *Lifetime Physical Fitness & Wellness: A Personalized Program* was made possible through the contributions of many individuals. In particular, we would like to express our gratitude to the reviewers of the 13th edition; their valuable comments and suggestions are most sincerely appreciated.

### Reviewers for the 14th edition:

Nancy A. Winberg, Western Technical College

Sarah Hilgers-Greterman, North Dakota State University

Paulette Howarth, Bristol Community College

Kelly Leavitt, Southwestern Oregon Community College

Mark Lee, North-West Shoals Community College

Craig Newton, Community College of Baltimore County

Karen Polon, Cottey College

Deonna Shake, Abilene Christian University

Alyssa Sinyard, St. Philip's College

Barbara Tyree, Valparaiso University

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# 1

## Physical Fitness and Wellness

*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.*

### Objectives

- > **Understand** the health and fitness consequences of physical inactivity.
- > **Identify** the major health problems in the United States.
- > **Learn** how to monitor daily physical activity.
- > **Learn** the Federal Physical Activity Guidelines for Americans.
- > **Define** wellness and list its dimensions.
- > **Define** physical fitness and list health-related and skill-related components.
- > **State** the differences among physical fitness, health promotion, and wellness.
- > **Distinguish** between health fitness standards and physical fitness standards.
- > **Understand** the benefits and significance of participating in a comprehensive wellness program.
- > **List** key national health objectives for the year 2020.
- > **Determine** if you can safely initiate an exercise program.
- > **Learn** to assess resting heart rate and blood pressure.



Image Source/Getty Images



## 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 would 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 behavior are lifestyle factors to work on first. Others should follow, depending on your current lifestyle behaviors.



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Modern-day conveniences lull people into a sedentary lifestyle.

**S**cientific findings have shown that physical inactivity and a negative lifestyle seriously threaten health and hasten the deterioration rate of the human body. Movement and physical activity are basic functions for which the human organism was created.

Advances in technology, however, have almost completely eliminated the necessity for physical exertion in daily life. Physical activity is no longer a natural part of our existence. We live in an automated society, where most of the activities that used to require strenuous exertion can be



## REAL LIFE STORY | Jim's Experience

I am pretty athletic and played baseball and basketball in high school. I also grew up eating well, since my dad is a chef who specializes in healthy cuisine. So when I got to college, I was sure that I was already doing everything necessary to be healthy. However, at the same time that I was congratulating myself for my healthy lifestyle, I was practicing some very unhealthy habits without even thinking about it. My sleep schedule was horrible. I would sometimes only get three to four hours of sleep a night. At times I would pull an “all-nighter” and other times I would crash and sleep for twelve hours. I drank huge amounts of black coffee, diet soda, or energy drinks to stay alert. I was under a lot of stress—I was pre-med and I was struggling in some of my classes. My two roommates and I did not get along, so there was constant fighting and tension between us. I felt isolated and unhappy, and I questioned whether I had made a

mistake choosing the college I did. In order to blow off steam, I started going to frat parties and drinking too much. I would often get sick and then suffer a hangover the next morning. I didn't see this as a problem because it seemed to be something a lot of students were doing. And to add to all that, after months of high-impact running on concrete surfaces, I ended up injuring my knee. I was barely able to move around, let alone work out. I was only in my second year of college when I took a fitness and wellness class. It was then that I really thought about how my lifestyle was affecting my health and wellness. During the course of the class, I made several changes. I tried to even out my sleep schedule and get seven to eight hours a night. To make that happen, I had to work on my



Karin Hildebrand Lau/Shutterstock.com

procrastination. I could no longer wait to write a paper until the night before it was due and still expect to get eight hours of sleep. This change actually helped me do better in my classes, which relieved some of my stress. The times when I still felt stressed out, I started meditating or listening to relaxing music instead of going out and drinking. I also learned about how to exercise safely and prevent injuries. I took up swimming, since it is a good, low-impact workout. I feel like just how sometimes problems can snowball and lead to more problems, small changes for the better can sometimes snowball too; and once you improve one habit, other things in your life become easier to fix. Because of the changes I have made, the rest of my college career has been much healthier and happier than my first year.

accomplished by machines with the simple pull of a handle or push of a button.

Most nations, both developed and developing, are experiencing an epidemic of physical inactivity. In the United States, physical inactivity is the second greatest threat to public health and is often referenced in new concerns about “Sitting Disease” and “**Sedentary Death Syndrome**” or **SeDS**. (The number-one threat to public health is tobacco use—the largest cause of preventable deaths.)

Worldwide obesity now claims triple the number of victims as malnutrition. Over the last two decades the world has transitioned from one where populations did not have enough to eat to one where, even in developing countries, an abundance of unhealthy food and inactivity is causing obesity, chronic diseases, and premature death. There is hope that, while individuals may feel powerless facing malnutrition, people with the right knowledge and support can arm themselves against physical inactivity and obesity. Widespread interest in **health** and preventive medicine in recent years is motivating people to reexamine the foods they eat, incorporate more movement into daily life activities, and participate in organized fitness and wellness programs.

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 “good life” (**sedentary** living, alcohol, fatty foods, excessive sweets, tobacco, and drugs), we saw a parallel increase in the incidence of **chronic diseases** such as cardiovascular disease, cancer, diabetes, and chronic respiratory diseases (Figure 1.1).

As the incidence of chronic diseases climbed, we recognized that prevention is the best medicine. Consequently, a fitness and wellness movement developed gradually in the

### GLOSSARY

**Sedentary Death Syndrome (SeDS)** Cause of deaths attributed to a general lack of regular physical activity.

**Health** A state of complete well-being—not just the absence of disease or infirmity.

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

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

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

## PERSONAL PROFILE: General Understanding of Fitness and Wellness

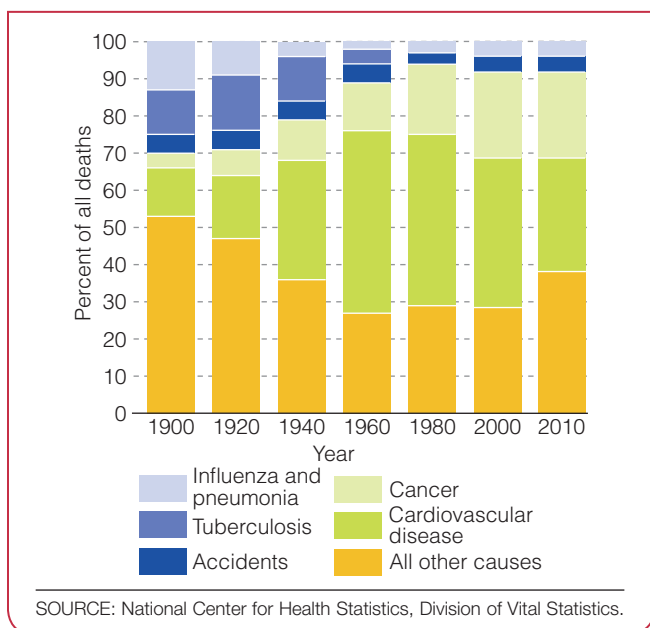
To the best of your ability, please answer the following questions. If you do not know the answer(s), this chapter will guide you through them.

- I. Physical fitness implies making a constant and deliberate effort to stay healthy and achieve the highest potential for well-being. \_\_\_ True \_\_\_ False
- II. The minimum requirement in the United States Federal Physical Activity Guidelines is that you accumulate \_\_\_ minutes of moderate-intensity aerobic activity or \_\_\_

minutes of vigorous-intensity aerobic activity on a weekly basis.

- III. Agility, balance, coordination, reaction time, power, and speed are the basic components of health-related fitness. \_\_\_ True \_\_\_ False
- IV. My current blood pressure is \_\_\_ / \_\_\_ mm Hg.
- V. I am aware of risk factors in my life that can increase my chances of developing chronic diseases. \_\_\_ Yes \_\_\_ No

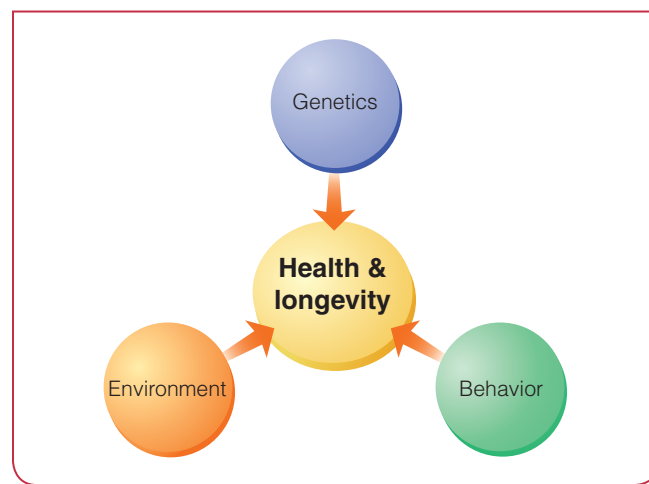
**Figure 1.1** Causes of deaths in the United States for selected years.



1980s. 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. We all desire to live a long life, and wellness programs seek to enhance the overall quality of life—for as long as we live.

There are three basic factors that determine our health and longevity: genetics, the environment, and our behavior (Figure 1.2). 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 with lifestyle choices. (For a more in-depth discussion on epigenetics see “Genetic vs Environmental Risk,” Chapter 11, pages 392–393.) 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. How we accomplish this goal will be thoroughly discussed through the chapters of this book.

**Figure 1.2** Factors that determine health and longevity.

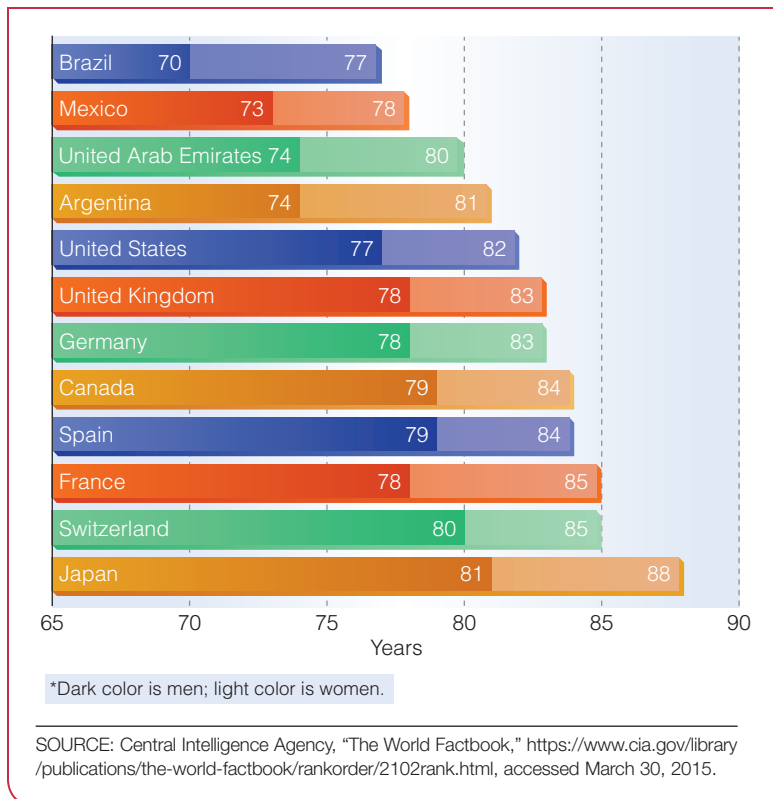


### 1.1 Life Expectancy

Currently, the average life expectancy in the United States is 79.6 years (77.1 years for men and 81.9 years for women). In the past decade alone, life expectancy has increased by one year—the news, however, is not all good. The data show that people now spend an extra 1.2 years with a serious illness and an extra two years of disability. Mortality has been postponed because medical treatments allow people to live longer with various chronic ailments (cardiovascular disease, cancer, and diabetes).

Based on data from the World Health Organization (WHO), the United States ranks 33rd in the world for life expectancy (see Figure 1.3). Japan ranks first in the world with an overall life expectancy of 84.46 years. 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.

Several factors may account for the current U.S. life expectancy ranking, including the extremely poor health of some groups (such as Native Americans, rural African Americans, and the inner-city poor) and fairly high levels of violence (notably homicides). The current trend is a widening disparity between those in the United States with the highest and lowest

**Figure 1.3** Life expectancy at birth for selected countries as of 2015.

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. Physical activity trends by U.S. county, in most cases, are aligned with life expectancy trends.<sup>1</sup>

The United States also has not made headway with many leading risk factors. Some countries, like Australia, have made progress by arranging primary care to better detect and intervene with hypertension, for example. The latest data indicate that one in four adults have at least two chronic conditions, and among the elderly in the United States, four in five are living with a minimum of two chronic diseases. In terms of preventative health service, most of these patients do not receive 56 percent of the clinical recommendations from 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."<sup>2</sup>

While not a single country has managed to lower its obesity rate in more than 30 years, some countries have seen slower rises in obesity than the United States. A report by the Organisation for Economic Co-operation and Development (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 36 OECD countries.<sup>3</sup> According to estimates from the Centers for Disease Control and Prevention, 35.1 percent of the adult population in the United States is

obese. As a nation, we are seeing the consequences of these numbers unfold. The latest statistical update from the American Heart Association reported that the incidence of diabetes has been climbing dramatically each year in parallel step with the increased incidence of obesity.<sup>4</sup> Currently, one of ten adults has type 2 diabetes. If we are unable to change the current trend, by 2050 the number of adults suffering from diabetes could be one in three. This will be one in three of our current elementary to college-age youth. Diabetes is the third most expensive chronic disease to treat, preceded only by angina (heart disease) and hypertension, respectively. All three of these chronic conditions are linked with obesity.<sup>5</sup> Additional information on the obesity epidemic and its detrimental health consequences is given in Chapter 5.

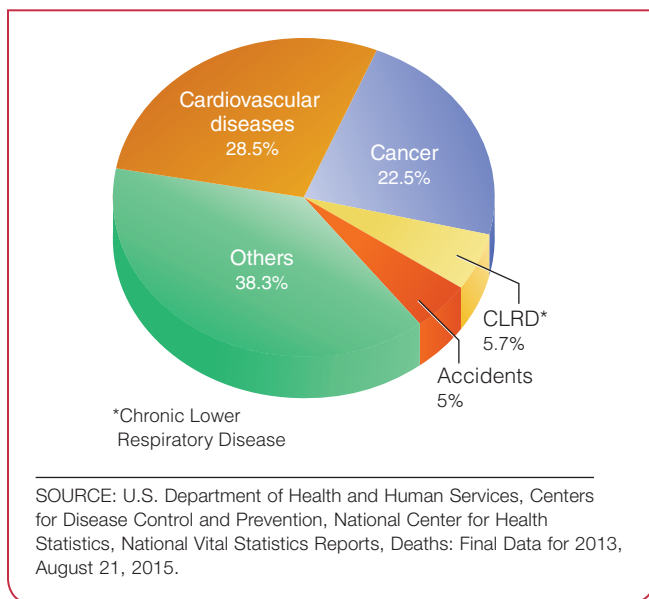
Life expectancy for men in the United States is almost 5 years lower than for women. For years it had been assumed that the difference is based on biology, but we are learning that most likely the gender gap is related to lifestyle behaviors most commonly observed in men. Around 1980, the gender gap 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.

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. Fewer programs are available that specifically target men's health issues. Thus, men need to take a more proactive role for their own health and public health policies.

"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 preventative 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. Of all road traffic fatalities among countries studied in the most recent OECD report, a disparate 74 percent of victims were men.

Although life expectancy in the United States gradually increased by 30 years over the past century, scientists from the National Institute of Aging believe that in the coming decades the average lifespan may decrease by as much as five years. This decrease in life expectancy will be related primarily to the growing challenges of inactivity and obesity. The current generation of children may not outlive their parents.



**Figure 1.4** Leading causes of death in the United States in 2013.

## 1.2 Leading Health Problems in the United States

The leading causes of death in the United States today are largely lifestyle related (Figure 1.4). The U.S. Centers for Disease Control and Prevention have found that 7 of 10 Americans die of preventable chronic diseases. Specifically, about 51 percent of all deaths in the United States are caused by cardiovascular disease and cancer.<sup>6</sup> Almost 80 percent of the latter deaths could be prevented through a healthy lifestyle program. The third and fourth leading causes of death, respectively, are chronic lower respiratory disease and accidents.

### HOEGER KEY TO WELLNESS



Scientists believe that a healthy lifestyle program has the power to prevent 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. About 30 percent of all deaths in this country are attributed to diseases of the heart and blood vessels (about 740,000 total deaths). According to the American Heart Association (AHA), 83.6 million people in the United States are afflicted with diseases of the cardiovascular system, including 77.9 million with hypertension (high blood pressure) and 15.4 million with coronary heart disease (CHD). (Many of these people have more than one type of cardiovascular disease.) These numbers are devastating but can change. As we gained our understanding of the effects of lifestyle on chronic disease during the second half of the twentieth century,

### 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.

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

more people participated in wellness programs and cardiovascular mortality rates dropped. The decline began in about 1963, and between 1960 and 2000, the incidence of cardiovascular disease dropped by 28 percent, with another 10 percent drop between 2000 and 2010. This decrease is credited to higher levels of wellness and better treatment modalities in the United States. A complete cardiovascular disease prevention program is outlined in Chapter 10.

### Cancer

The second leading cause of death in the United States is cancer. Even though cancer is not the number-one killer, it is the number-one health fear of the American people. About 23 percent of all deaths in the United States are attributable to cancer. About 590,000 Americans died from this disease in 2015 (that is 1600 each day), and more than 1.7 million new cases were reported the same year.<sup>7</sup> The major contributor to the increase in the incidence of cancer deaths during the past five decades is lung cancer, of which 90 percent for males and 80 percent for females is caused by tobacco use.<sup>8</sup> Furthermore, smoking 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. A comprehensive cancer-prevention program is presented in Chapter 11.

### Chronic Lower Respiratory Disease (CLRD)

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;

## 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 four-fold.** The risk is identical for a hands-free device and a hand held phone.<sup>9</sup>
- 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.<sup>10</sup>
- 4. Having a conversation with an adult passenger is safer than holding 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 affects 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 breaking. This is termed “reaction time switching costs.”
- 7. 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.**
- 8. Making a left turn while talking on a cell phone or hands free device is among the most dangerous driving activities.<sup>11</sup>**
- 9. Reaching for a moving object or turning in your seat increases accident collision by 8 to 9 times.**
- 10. Texting while driving increases collision incidence by 16 times.** Driving while talking on a cell phone is done more frequently by more drivers for longer lengths of time than texting, and so causes more deaths. 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.
- 11. Parents driving children are just as likely to talk on the phone and use distractions including navigation systems as other drivers.<sup>12</sup>**
- 12. 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 hands-free.<sup>13</sup>**
- 13. 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.

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 for individuals sensitive to chlorine vapor.

### Accidents

Accidents are the fourth leading cause of death. Even though not all accidents are preventable, many are. Fatal accidents are often related to abusing drugs, not wearing seat belts, and distracted driving.

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. Proper nutrition, exercise, stress management, and abstinence from cigarette smoking are of little help if the person is involved in a disabling or fatal accident as a result of distraction, a single reckless decision, or not wearing seat belts properly.

Accidents do not just happen. We cause accidents, and we are victims of accidents. Although some factors in life, such as earthquakes, tornadoes, and airplane accidents, are completely beyond our control, more often than not, personal safety and accident prevention are a matter of common sense. Most

### GLOSSARY

**Cardiovascular** Of or relating to the heart and blood vessels.

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.

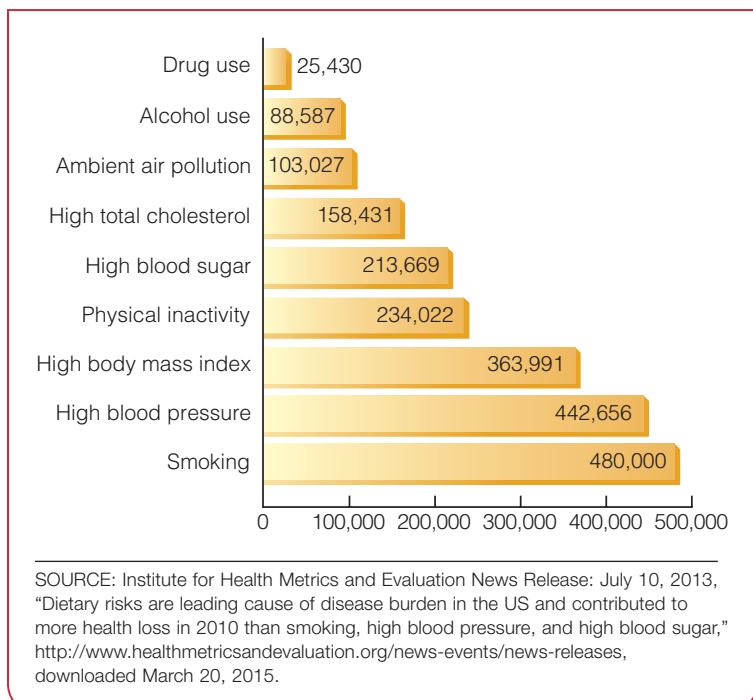
With the advent of cell phones, distracted driving accidents have climbed. On an average day in the United States nine people are killed as a result of distracted driving, and 1,153 people are injured. As the Senior Director of Transportation Strategic Initiatives for the National Safety Council, David 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. Furthermore, a report by *Traffic Injury Prevention* indicates that texting while driving is as dangerous as driving with blood alcohol levels at or above legal driving limits. Research utilizing brain imaging has uncovered the cognitive workload and collision risk during multiple driving scenarios (see Distracted Driving Box on page 7).

Alcohol abuse is the number-one 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 28 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** and mortality (Chapter 13).

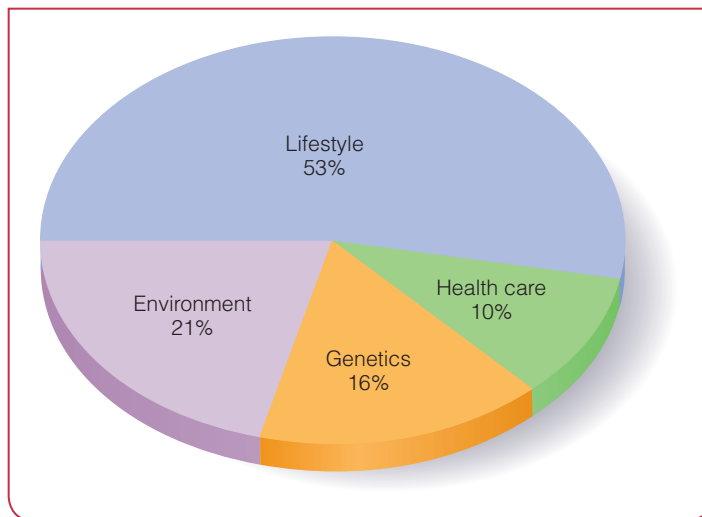
### Lifestyle as a Health Problem

The underlying causes of death attributable to leading **risk factors** in the United States (Figure 1.5) indicate that most

**Figure 1.5** Death from all causes attributable to lifestyle-related risk factors for men and women in the United States.



**Figure 1.6** Factors that affect health and well-being.



factors are related to lifestyle choices we make. Of the approximately 2.5 million yearly deaths in the United States, 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 deaths 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. Only 16 percent is related to genetic factors (Figure 1.6). Thus, the individual controls as much as 84 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.

Because of the unhealthy lifestyles that many young adults lead, their bodies may be middle-aged or older! Many school physical fitness programs do not emphasize the skills necessary for young people to maintain a high level of fitness and health throughout life. The intent of this book is to provide those skills and help to prepare you for a lifetime of physical fitness and wellness. A healthy lifestyle is self-controlled, and you can learn how to be responsible for your own health and fitness. Healthy choices made today influence health for decades.

## 1.3 Physical Activity and Exercise Defined

Abundant scientific research over the past three decades has established a distinction between physical activity and exercise. **Exercise** is a type of activity that requires planned, structured, and repetitive bodily movement to improve or maintain one or more components of physical fitness. Examples of exercise are walking, running, cycling, aerobics, swimming, and



strength training. Exercise is usually viewed as an activity that requires a vigorous-intensity effort.

**Physical activity** is bodily movement produced by skeletal muscles. It requires energy expenditure and produces progressive health benefits. Examples of simple daily physical activity include walking to and from work, taking the stairs instead of elevators and escalators, gardening, doing household chores, dancing, and washing the car by hand. Physical inactivity, by contrast, implies a level of activity that is lower than that required to maintain good health.

Physical activity can be of light intensity or moderate to vigorous intensity. Extremely light expenditures of energy throughout the day needed to pick up children, set and clear the table, stand at a counter, take the stairs, or carry the groceries are of far greater significance in our overall health than we once realized. We now know that every movement conducted throughout the day matters.

To better understand the impact of all intensities of physical activity, scientists created a new category of movement called **nonexercise activity thermogenesis (NEAT)**. Any energy expenditure that does not come from basic ongoing body functions (such as digesting food) or planned exercise is categorized as NEAT.<sup>14</sup> A person on an average day may expend 1300 calories simply maintaining vital body functions (the basal metabolic rate) and 200 calories digesting food (thermic effect of food). Any additional energy expended during the day is expended either through exercise or NEAT. For an active person, NEAT accounts for a major portion of energy expended each day. Though it may not increase cardiorespiratory fitness as moderate or vigorous exercise will, NEAT can easily use more calories in a day than the planned exercise session itself. As a result, NEAT is extremely critical to keep daily energy balance in check. For example, a person with a desk job who has the option to stand and move about throughout the day will expend 300 more calories than a person who sits at the desk most of the day. People who spend most of the day working on their feet, such as a medical assistant or a stay-at-home parent, expend an additional 700 daily calories. People with physically demanding jobs, such as construction workers, can easily burn an additional 1600 daily calories.<sup>15</sup>

Beyond the workday are several hours of leisure time that can also be spent quite differently through a vast number of physical activities. Variations in NEAT will add up over the days, months, and years; and provide substantial benefits with weight management and health.

#### HOEGER KEY TO WELLNESS



By being more active throughout the day and avoiding excessive sitting, people can increase their daily energy (caloric) expenditure by the equivalent of a seven-mile run. They will also increase years of healthy life expectancy.

## 1.4 Importance of Increased Physical Activity

The U.S. Surgeon General, along with various other national and global health organizations, has announced that poor health as a result of lack of physical activity is a serious public health problem that must be met head-on at once. Regular **moderate physical activity** provides substantial benefits in health and well-being for the vast majority of people who are not physically active. For those who are already moderately active, even greater health benefits can be achieved by increasing the level of physical activity.

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.<sup>16</sup> Regular physical activity also is important for the health of muscles, bones, and joints, and has been shown in clinical studies to improve mood, cognitive function, creativity, and short-term memory, and enhance one's ability to perform daily tasks throughout life. It also can have a major impact on health care costs and quality of life into old age.

Moderate physical activity has been defined as any activity that requires an energy expenditure of 150 calories per day, or 1,000 calories per week. The general health recommendation is that people strive to accumulate at least 30 minutes of physical activity a minimum of 5 days per week (alternatively 75 minutes of vigorous aerobic activity may be substituted) in addition to two strength-training sessions or activities per week. Moderate physical activity should preferably be divided into 30-minute segments over a minimum of 5 days each week (Table 1.1). Although 30 minutes of continuous moderate physical activity is preferred, on days when time is limited, three activity sessions of at least 10 minutes each still

#### GLOSSARY

<b>Morbidity</b> A condition related to or caused by illness or disease.	energy and produces progressive health benefits. Examples include walking, taking the stairs, dancing, gardening, yard work, house cleaning, snow shoveling, washing the car, and all forms of structured exercise.
<b>Risk Factors</b> Lifestyle and genetic variables that may lead to disease.	
<b>Exercise</b> A type of physical activity that requires planned, structured, and repetitive bodily movement with the intent of improving or maintaining one or more components of physical fitness.	<b>Nonexercise Activity Thermogenesis (NEAT)</b> Energy expended doing everyday activities not related to exercise.
<b>Physical activity</b> Bodily movement produced by skeletal muscles; requires expenditure of	<b>Moderate physical activity</b> Activity that uses 150 calories of energy per day, or 1,000 calories per week.