# Lifetime Physical Fitness & Wellness

## A PERSONALIZED PROGRAM

14TH EDITION

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

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14th EDITION

# Lifetime Physical Fitness & Wellness

## A Personalized Program

Werner W. K. Hoeger
Boise State University

Sharon A. Hoeger
Cherie I. Hoeger
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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 21st 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).

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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.

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 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.



# Acknowledgments

This book is dedicated to Dr. Lois S. Hale and Dr. David R. Hopkins—colleagues, mentors, and lifetime friends. We are grateful for their unconditional help and support throughout the years.

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.

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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?

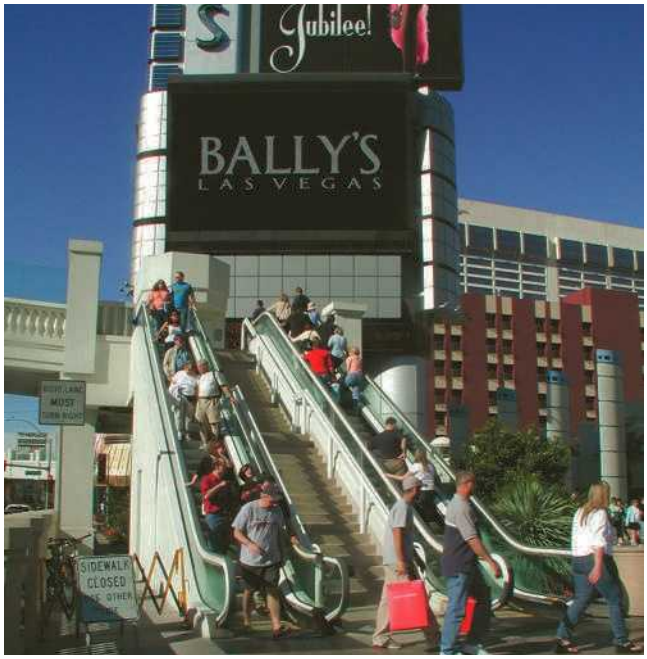
Most people go to college to learn how to make a living, but a fitness and wellness course will teach you how to *live*—how to truly live life to its fullest potential. Some people seem to think that success is measured by how much money they make. Making a good living will not help you unless you live 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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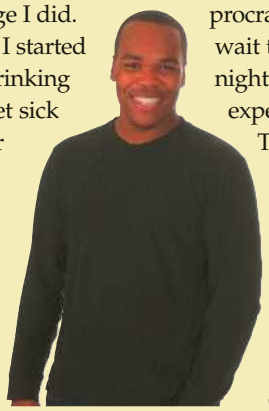
Modern-day conveniences lull people into a sedentary lifestyle.

Scientific 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 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.



Karin Hildebrand Lau/ShutterStock.com

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

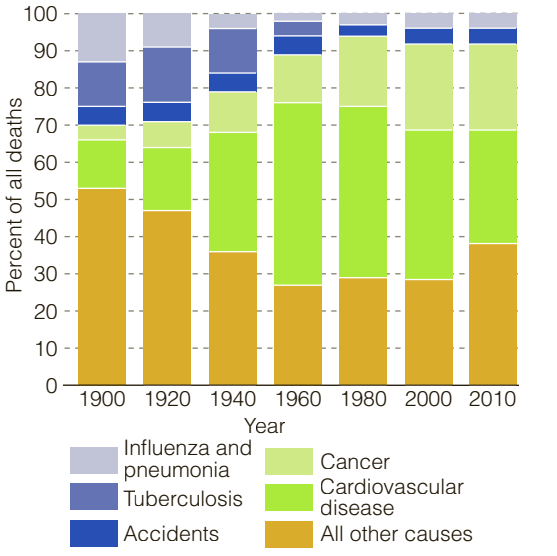
II. The minimum requirement in the United States Federal Physical Activity Guidelines is that you accumulate ___ minutes of moderate-intensity aerobic activity or ___ minutes of vigorous-intensity aerobic activity on a weekly basis.

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.

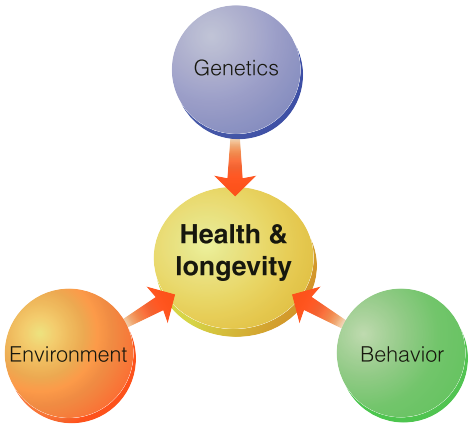
V. I am aware of risk factors in my life that can increase my chances of developing chronic diseases. ___ Yes ___ No

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




SOURCE: National Center for Health Statistics, Division of Vital Statistics.

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






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.

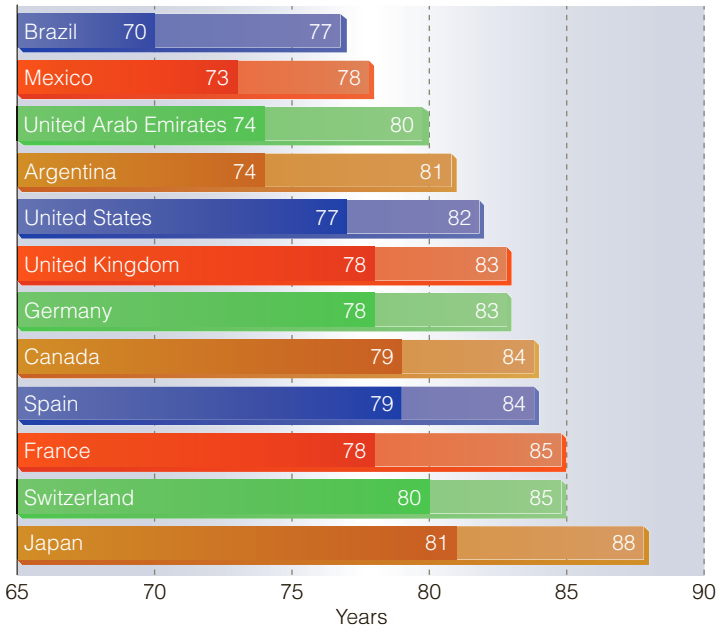
## 1.1 *Life Expectancy*

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.**




*Dark color is men; light color is women.

SOURCE: Central Intelligence Agency, "The World Factbook," https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html, accessed March 30, 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.[1]

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."[2]

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.[3] 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.[4] 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.[5] Additional information on the obesity epidemic and its detrimental health consequences is given in Chapter 5.

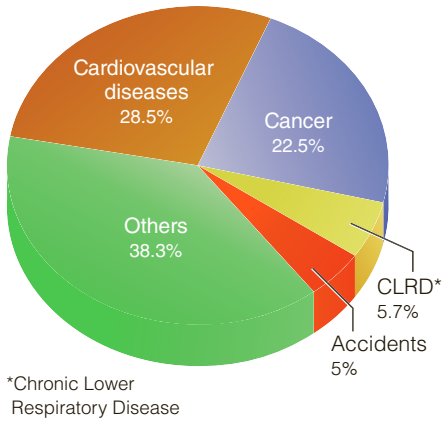
Life expectancy for men in the United States is almost 5 years lower than for women. For years it had been assumed that the difference is based on biology, but we are learning that most likely the gender gap is related to lifestyle behaviors most commonly observed in men. Around 1980, the gender gap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




SOURCE: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics Reports, Deaths: Final Data for 2013, August 21, 2015.

## 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.[6] 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, 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.

### 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.

### 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.[7] 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.[8] 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.[9]
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.[10]
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.**[11]
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.**[12]
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.**[13]
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).

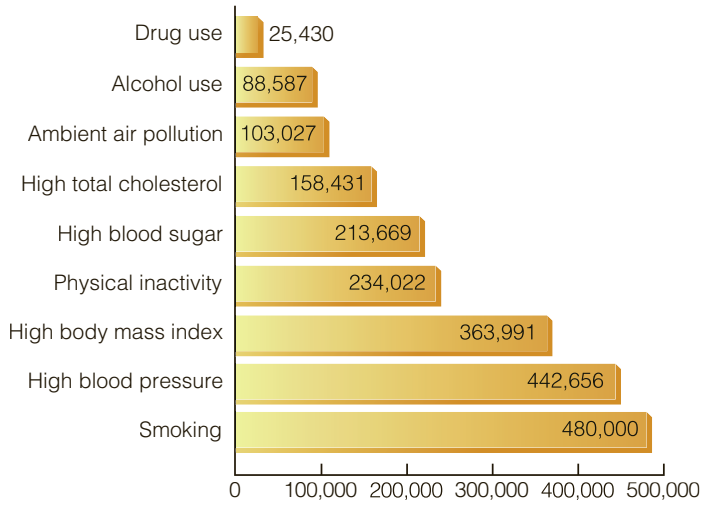
## Lifestyle as a Health Problem

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

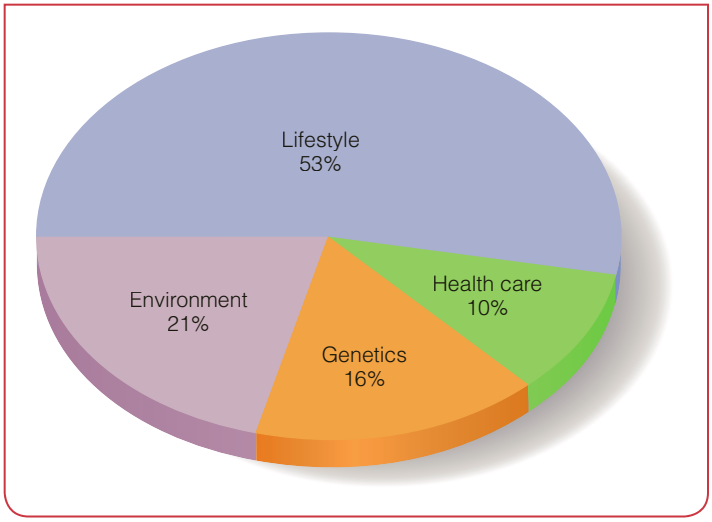
Because of the unhealthy lifestyles that many young adults lead, their bodies may be middle-aged or older! Many school physical fitness programs do not emphasize the skills necessary for young people to maintain a high level of fitness and health throughout life. The intent of this book is to provide 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.

**Figure 1.5 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: July 10, 2013, "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," http://www.healthmetricsandevaluation.org/news-events/news-releases, downloaded March 20, 2015.

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






## 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.[14] 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.[15]

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.[16] 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

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

**Risk Factors** Lifestyle and genetic variables that may lead to disease.

**Exercise** 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.

**Physical activity** Bodily movement produced by skeletal muscles; requires expenditure of 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.

**Nonexercise Activity Thermogenesis (NEAT)** Energy expended doing everyday activities not related to exercise.

**Moderate physical activity** Activity that uses 150 calories of energy per day, or 1,000 calories per week.

**Table 1.1 Physical Activity Guidelines**

| Benefits | Duration | Intensity | Frequency per Week | Weekly Time |
|---|---|---|---|---|
| Health | 30 min | MI* | 5 times | 150 min |
| Health and fitness | 20 min | VI* | 3 times | 75 min |
| Health, fitness, and weight gain prevention | 60 min | MI/VI† | 5–7 times | 300 min |
| Health, fitness, and weight regain prevention | 60–90 min | MI/VI† | 5–7 times | 450 min |

*MI = moderate intensity, VI = vigorous intensity

†MI/VI = You may use MI or VI or a combination of the two







An active lifestyle increases health, quality of life, and longevity.

provide substantial health benefits. Examples of moderate physical activity are brisk walking or cycling, playing basketball or volleyball, recreational swimming, dancing fast, pushing a stroller, raking leaves, shoveling snow, washing or waxing a car, washing windows or floors, and gardening.

Light-intensity activities of daily living such as casual walking, self-care, shopping, or those lasting less than 10 minutes in duration are not included as part of the moderate physical activity recommendation, though they are included as part of one's NEAT for a given day. Although 30 minutes of moderate- or vigorous-intensity physical activity provides substantial health benefits, new data indicate that most of these benefits may be voided if people spend the majority of the rest of the day in a sedentary condition. Sitting for long periods of time has been recently and solidly established as an independent risk factor for premature morbidity and mortality. Some organizations have suggested that exposure to sitting time be treated like any other deadly risk factor, such as excessive sun exposure.

Because of the ever-growing epidemic of obesity in the United States and the world, adults are encouraged to increase physical activity beyond the minimum requirements and adjust caloric intake until they find their personal balance to maintain a healthy weight.[17] Individuals are also advised that additional physical activity beyond minimum thresholds is necessary for some and can provide additional health benefits for all.

The latest Physical Activity Guidelines for Americans issued by the U.S. Department of Health and Human Services have stated that some adults should be able to achieve calorie balance with 150 minutes of moderate physical activity in a week, while others will find they need more than 300 minutes per week.[18] This recommendation was based on evidence indicating that people who maintain healthy weight typically accumulate 1 hour of daily physical activity,[19] though some workouts have been shown more effective than others at managing weight (see, for example, High Intensity Interval Training in Chapter 9, pages 327–328).

In sum, although health benefits are derived from 30 minutes of physical activity performed on most days of the week, people with a tendency to gain weight need to be physically active for longer, from 60 to as many as 90 minutes daily, to prevent weight gain. This additional activity per day provides additional health benefits, including a lower risk for cardiovascular disease and diabetes.

## "Sitting Disease": A 21st Century Chronic Disease

The human body requires time to recover (sit and sleep) from labor, tasks, and other typical daily activities. Most Americans, however, sit way too many hours than ever before. On *average* people spend about 8 hours per day or more of their waking time sitting. Prolonged sitting is unnatural to the body and research now indicates that too much sitting is hazardous to human health and has a direct link to premature mortality.[20] Although not recognized by the medical community as a diagnosable illness, the scientific community has coined the term "**sitting disease**" as a chronic 21st century disease, and an entirely new field of study has emerged termed "inactivity physiology" that works to combat the detrimental effects of excessive sitting on health and well-being.

The data indicate that the risks that come with sitting are independent from those related to physical activity levels. Like the gas or the brake pedal on a car, physical activity or prolonged sitting each act upon human physiology in their own, independent way. Therefore, even if people exercise five times per week for at least 30 minutes but otherwise spend most of the day sitting, they are accruing health risks as quickly as they are preventing them.

Our bodies are simply not designed for extended periods of sitting. As we sink into inactivity, our biological processes begin to change, down to a cellular and molecular level. Researchers are only beginning to understand all of the factors at work, but studies show, for example, that blood flow becomes sluggish and is more likely to form life-threatening clots in the lungs and legs. Slower blood flow also means less oxygen and glucose delivered to the brain and body, and as a result cognitive function declines and the feeling of fatigue increases. An act as simple as standing several times throughout the day can keep abdominal, gluteus, and other antigravity muscles working. Additionally, during extended sitting, cells in idle muscles don't respond to insulin (including skeletal muscles which are responsible for 80 percent of glucose disposal during activity), thus insulin resistance increases along with the accompanying risk for diabetes and cardiovascular disease.

Further, remaining inactive following meals makes blood glucose levels spike. A slow stroll after a meal can halve this bump in blood glucose levels. When sitting, however, the level of triglycerides (blood fats) jumps because inactive muscles also stop producing an enzyme (lipoprotein lipase) that usually captures these fats from the blood in order to turn them into fuel. Even HDL cholesterol levels (the good cholesterol) drop by 20 percent after as little as one hour of uninterrupted sitting.

Chronic back pain becomes more likely as all upper-body weight rests on sitting bones, thus the muscles that support the spine get tighter and the lumbar region bows as a result. Simply standing can relieve bowing of the lumbar region and distribute weight evenly along the entire length of the spine. Posture problems multiply as abdominal muscles weaken and hamstrings and hip flexors shorten and tighten from extended sitting. Inactivity further appears to switch on or off dozens of genes that trigger additional risk factors.

The results of excessive sitting have a direct consequence on premature mortality. Death rates are high for people who spend most of their day sitting, even though they meet the minimum physical activity recommendations on a weekly basis. The data show that:

- Time spent sitting correlates to overall health: The more time you spend sitting throughout the day, the greater the risk for adverse health effects.
- Sitting for more than 3 hours per day cuts off two years of life, even if you regularly exercise and avoid unhealthy habits like smoking.
- People who spend most of their day sitting have as much as a 50 percent greater risk of dying prematurely from all causes and an 80 percent greater risk of dying from cardiovascular disease.
- Inactive adults over age 60 are at almost 50 percent greater odds of disability for each additional hour they sit per day.[21]
- Excessive sitting is the "new smoking." The risk of a heart attack in people who sit most of the day is almost the same as that of smokers.
- Prolonged daily sitting time, independent of the daily physical activity/exercise routine, is an underestimated risk factor for cancer and has an effect on overall risk of premature death. Too much sitting has been estimated to cause 92,000 cancer deaths each year in the United States alone (49,000 breast cancers and 42,000 colon cancers).
- Americans who decrease their sitting time to half can expect a 2-year increase in life expectancy. Furthermore, reducing TV viewing to less than 2 hours per day adds another 1.4 years of life.
- Less sitting means greater comfort. Study participants who reduced their sitting time by 66 minutes a day reported feeling less fatigued and more energetic, focused, productive, and comfortable, and reported 54 percent less back and neck pain.[22]

Most people do not realize how much time they spend sitting on a given day. On any given day, consider the amount of time that you spend driving to and from school or work (1 hour); sitting in classes or working at the office (8 hours); eating meals (1 to 1.5 hours), doing homework (2 to 4 hours), or enjoying your typical recreational hours watching TV, checking email, playing games, and catching up on social networking (2 to 6 hours). You can easily accumulate 8 to 12 or more sitting hours. We can easily spend the majority of our day in the seated position, it is only the chair beneath us that changes.

**HOEGER KEY TO WELLNESS**

**Standing triples the energy requirement of doing a similar activity sitting. For extended periods of work or study adopt a rotating pattern of standing and sitting roughly every 20 minutes.**

**GLOSSARY**

**Sitting disease** A term coined by the scientific community to refer to the detrimental health effects cause by excessive sitting throughout most days of the week.



Standing burns more calories than sitting and helps prevent the risk factors that result from being sedentary. Portable standing desks like the StandStand can help reduce overall daily sitting time.

You can fight sitting disease by taking actions to break up periods of inactivity and by becoming more physically active. The key is to sit less and move more. To minimize inactivity when you have limited time and space, look for opportunities to increase NEAT. Aim to achieve NEAT for a minimum of 10 minutes every waking hour. Examples of such activities include:

1. Walk instead of drive when you only need to go short distances.
2. Park farther away or get off the subway, train, or bus several blocks from the campus or office.
3. Take a short walk right after each meal or snack.
4. Walk faster than usual.
5. Move about whenever you take a break.
6. Take the stairs as often as you can. Walk up and down the escalators when you don't have a choice of stairs.
7. When watching TV, stand up and move during each commercial break, or even better, stretch or work out during TV time. When working or watching TV, drink plenty of water, which is not only healthy on its own but will give you extra reasons to take a walk for refills and bathroom breaks.
8. Do not shy away from housecleaning chores or yard work, even for a minute or two at a time.
9. Stand more while working/studying. Place your computer on an elevated stand or shelf and stand while doing work, writing emails, or surfing the Internet. Standing triples the energy requirement of doing a similar activity sitting. For extended periods of work or study adopt a rotating pattern of standing and sitting roughly every 20 minutes.
10. Always stand or pace while talking on the phone.
11. When reading a book, get up and move after every 6–10 pages of the book.
12. Use a stability ball for a chair. Such use enhances body stability, balance, and abdominal, low back, and leg strength.
13. Whenever feasible, walk while conversing or holding meetings. If meetings are in a conference room, take the initiative to stand.
14. Walk to classmates' homes or coworkers' offices to study or discuss matters with them instead of using the phone, email, or computer.

Research has not identified the ideal prescription of activity to break up sitting. A good guideline seems to be to stand and stretch after every 20 minutes of inactivity, and to take intermittent 10-minute breaks for every hour that you are at the computer or studying. Stretching, walking around, or talking to others while standing or walking is beneficial and increases oxygen flow to the brain, making you more effective and productive.

## 1.5 Monitoring Daily Physical Activity

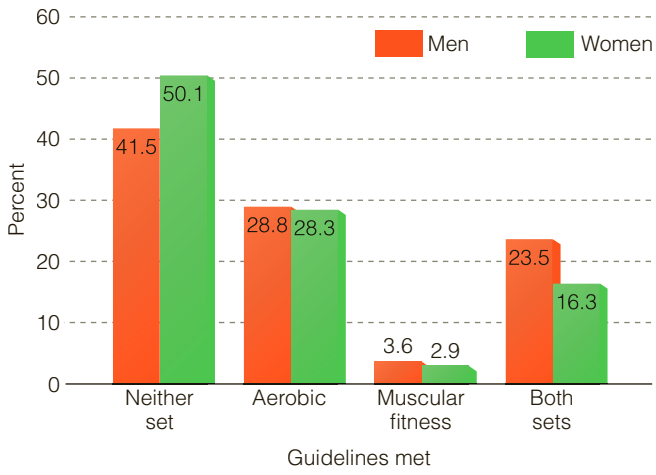
The majority of U.S. adults are not sufficiently physically active to promote good health. The most recent data released in 2012 by the Centers for Disease Control and Prevention (CDC) indicate that only 19.8 percent of U.S. adults 18 and over meet the federal physical activity guidelines for both aerobic and muscular fitness (strength and endurance) activities, whereas 28.6 percent meet the guidelines for aerobic fitness. Another 46 percent of Americans are completely inactive during their leisure time (Figure 1.7).

### Pedometers and Activity Trackers

Having an accurate idea of the level of activity you get in a day can guide your fitness goals, especially once you move past the initial shock some of us have faced once we realize how little activity we actually get. Accurate data is the foundation for results. Studies have proven that concrete daily step goals inspire individuals to action. The first trick is choosing the method you will use to track your activity, and today's options abound.

Both an **activity tracker** built specifically for this job and the average smartphone contain a device called an accelerometer. The accelerometer itself is an inexpensive device that simply

**Figure 1.7 Percentage of adults who did not meet and who met the 2008 federal guidelines for physical activity by gender.**




SOURCE: CDC, "Summary Health Statistics for U.S. Adults: Health Interview Survey, 2012," (February 2014) Table 26: Frequency distributions of participants in leisure-time aerobic and muscle-strengthening activities."

measures gravity and changes in movement. Activity trackers add to that functionality an array of features. Popular activity trackers not only count your steps and monitor daily movement levels but also offer features like the ability to vibrate when you've been sedentary too long, to track your sleep, or to check your heart rate. Further, accompanying smartphone apps provide feedback on your progress, help set goals, and allow support through online social networks. In accuracy tests, accelerometers have shown an average 15 percent discrepancy from actual activity, a similar accuracy record to a good pedometer. Most are worn on the wrist versus the hip or foot. While wrist placement is not as accurate most users find it most convenient.

Activity trackers seem to be best at recording straightforward actions that are part of daily physical activity such as brisk walking or jogging. However, they tend to be inaccurate when recording less rhythmic activities, vigorous exercise, overall calories burned, sleep, or other metrics. Both accelerometers and pedometers tend to lose accuracy at a very slow walking speed (slower than 30 minutes per mile) because the movement of the wrist or vertical movement of the hip is too small to be accurately recorded by the accelerometer or to trigger the spring-mounted lever arm inside the pedometer. As you can imagine, a wrist-worn activity tracker will not do well measuring a grueling bike workout. Users simply need to keep these limitations in mind.

In terms of step accuracy, a good pedometer will offer the same information as an activity tracker for the price of about $25 as opposed to $100 or more. For some individuals the added features of an activity tracker are worth the added price. If you opt for an activity tracker, be sure to check reliable reviews and weigh the features that are most important to you before purchasing. Some companies offer different models depending on whether you are interested in tracking daily activity or vigorous exercise. And be sure to follow instructions to calibrate the device to your personal stride. In a category all its own is the Apple Watch, which has a higher price point but differentiates between how much you exercise, move, and stand during the day.

Another option is to consider putting the accelerometer in your smart phone to work with an activity app, which has been shown to be similar in accuracy to an activity tracker. Choose an app from a well-regarded health foundation or university, such as the Mayo Clinic or Johns Hopkins University. If you choose an app created by an independent group or person, be especially wary as spurious information is a possibility. The challenge you may face when using your phone as an activity tracker is carrying it with you consistently throughout the day, dealing with a shorter battery life, and avoiding having the phone in close contact with you if you are concerned about radio frequency waves.

A traditional pedometer is still an excellent option. Before purchasing, however, be sure to verify its accuracy and check ratings available online. Many of the free and low-cost pedometers provided by corporations for promotion and advertisement purposes are inaccurate, so their use is discouraged.

To test the accuracy of a pedometer or activity tracker, follow these steps: Clip the pedometer on the waist directly above the kneecap or wear the activity tracker as you plan to on a normal day, reset the reading to zero, carefully close the pedometer if using or check your activity tracker reading, walk exactly 50 steps at your normal pace, carefully open the pedometer if using, and look at the number of steps recorded. A reading within 10 percent of the actual steps taken (45 to 55 steps) is acceptable.



Activity trackers and pedometers can be used to monitor daily physical activity; the recommendation is a minimum of 10,000 steps per day.

GLOSSARY

**Activity Tracker** An electronic device that contains an accelerometer (a unit that measures gravity, changes in movement, and counts footsteps). These devices can also determine distance, calories burned, speeds, and time spent being physically active.

**Table 1.2 Adult Activity Levels Based on Total Number of Steps Taken per Day**

| Steps per Day | Category |
|---|---|
| <5,000 | Sedentary lifestyle |
| 5,000–7,499 | Low active |
| 7,500–9,999 | Somewhat active |
| 10,000–12,499 | Active |
| ≥12,500 | Highly active |

SOURCE: C. Tudor-Locke and D. R. Basset, "How Many Steps/Day Are Enough? Preliminary Pedometer Indices for Public Health," *Sports Medicine* 34 (2004):1–8.

## Recommended Steps per Day

The typical male American takes about 6,000 steps per day, in comparison to women, who take about 5,300 steps. The general recommendation for adults is 10,000 steps per day, and Table 1.2 provides specific activity categories based on the number of daily steps taken.

All daily steps count, but some of your steps should come in bouts of at least 10 minutes, so as to meet the national physical activity recommendation of accumulating 30 minutes of moderate-intensity physical activity in at least three 10-minute sessions five days per week. A 10-minute brisk walk (a distance of about 1,200 yards at a 15-minute per mile pace) is approximately 1,300 steps. A 15-minute-mile (1,770 yards) walk is about 1,900 steps.[23] Thus, some activity trackers have an "aerobic steps" function that records steps taken in excess of 60 steps per minute over a 10-minute period of time.

If you do not accumulate the recommended 10,000 daily steps, you can refer to Table 1.3 to determine the additional walking or jogging distance required to reach your goal. For example, if you are 5'8" tall and female, and you typically accumulate 5,200 steps per day, you would need an additional 4,800 daily steps to reach your 10,000-steps goal. You can do so by jogging 3 miles at a 10-minute-per-mile pace (1,602 steps × 3 miles = 4,806 steps) on some days, and you can walk 2.5 miles at a 15-minute-per-mile pace (1,941 steps × 2.5 = miles = 4,853 steps) on other days. If you do not find a particular speed (pace) that you typically walk or jog at in Table 1.3, you can estimate the number of steps at that speed using the prediction equations at the bottom of this table.

**HOEGER KEY TO WELLNESS**

**The general recommendation for adults is to take 10,000 steps per day. A 10-minute brisk walk is approximately 1,300 steps.**

The first practical application that you can undertake in this course is to determine your current level of daily activity. The log provided in Activity 1.1 will help you do this. Keep a four-day log of all physical activities that you do daily. On this log, record the time of day; type and duration of the exercise/activity; and, if possible, steps taken while engaged in the activity. The results will indicate how active you are and serve as a basis to monitor changes in the next few months and years.

# 1.6 National Initiatives to Promote Healthy and Active Lifestyles

## Federal Guidelines for Physical Activity

Because of the importance of physical activity to our health, the U.S. Department of Health and Human Services issued *Physical Activity Guidelines for Americans*. These are the weekly minimums that have been discussed throughout this chapter.

**Table 1.3 Estimated Number of Steps to Walk, Jog, or Run a Mile Based on Pace, Height, and Gender**

| | Pace (min/mile) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Walking | | | | | | | | Jogging/Running | | | |
| | 20 | | 18 | | 16 | | 15 | | 12 | 10 | 8 | 6 |
| Height | Women | Men | Women | Men | Women | Men | Women | Men | (both men and women) | | | |
| 5'0" | 2,371 | 2,338 | 2,244 | 2,211 | 2,117 | 2,084 | 2,054 | 2,021 | 1,997 | 1,710 | 1,423 | 1,136 |
| 5'2" | 2,343 | 2,310 | 2,216 | 2,183 | 2,089 | 2,056 | 2,026 | 1,993 | 1,970 | 1,683 | 1,396 | 1,109 |
| 5'4" | 2,315 | 2,282 | 2,188 | 2,155 | 2,061 | 2,028 | 1,998 | 1,965 | 1,943 | 1,656 | 1,369 | 1,082 |
| 5'6" | 2,286 | 2,253 | 2,160 | 2,127 | 2,033 | 2,000 | 1,969 | 1,937 | 1,916 | 1,629 | 1,342 | 1,055 |
| 5'8" | 2,258 | 2,225 | 2,131 | 2,098 | 2,005 | 1,872 | 1,941 | 1,908 | 1,889 | 1,602 | 1,315 | 1,028 |
| 5'10" | 2,230 | 2,197 | 2,103 | 2,070 | 1,976 | 1,943 | 1,913 | 1,880 | 1,862 | 1,575 | 1,288 | 1,001 |
| 6'0" | 2,202 | 2,169 | 2,075 | 2,042 | 1,948 | 1,915 | 1,885 | 1,852 | 1,835 | 1,548 | 1,261 | 974 |
| 6'2" | 2,174 | 2,141 | 2,047 | 2,014 | 1,920 | 1,887 | 1,857 | 1,824 | 1,808 | 1,521 | 1,234 | 947 |

Prediction equations (pace in min/mile and height in inches):

Walking

Women: Steps/mile = 1,949 + [(63.4 x pace) – (14.1 × height)]

Men: Steps/mile = 1,916 + [(63.4 x pace) – (14.1 × height)]

Jogging

Women and Men: Steps/mile = 1,084 + [(63.4 x pace) – (14.1 × height)]

Adapted from Werner W. K. Hoeger et al., "One-Mile Step Count at Walking and Running Speeds," *ACSM's Health & Fitness Journal*, Vol 12(1):14–19, 2008.

## Activity 1.1 Daily Physical Activity Log

**Name** _____ **Date** _____

**Course** _____ **Section** _____ **Gender** _____ **Age** _____

Date: _____ Day of the Week: _____

| Time of Day | Exercise/Activity | Duration | Number of steps | Comments |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Totals: | | | | |

Activity category based on steps per day (use Table 1.2, page 14): _____

Date: _____ Day of the Week: _____

| Time of Day | Exercise/Activity | Duration | Number of steps | Comments |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Totals: | | | | |

Activity category based on steps per day (use Table 1.2, page 14): _____

## Activity 1.1 Daily Physical Activity Log *(continued)*

Date: _____ Day of the Week: _____

| Time of Day | Exercise/Activity | Duration | Number of steps | Comments |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Totals: | | | | |

Activity category based on steps per day (use Table 1.2, page 14): _____

Date: _____ Day of the Week: _____

| Time of Day | Exercise/Activity | Duration | Number of steps | Comments |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Totals: | | | | |

Activity category based on steps per day (use Table 1.2, page 14): _____

Briefly evaluate your current activity patterns, discuss your feelings about the results, and provide a goal for the weeks ahead.

These guidelines complement the current *Dietary Guidelines for Americans* (Chapter 3, pages 128–129) and parallel the international recommendations issued by the World Health Organization (WHO)[24] and recommendations issued by the American College of Sports Medicine (ACSM) and the American Heart Association (AHA).[25]

The federal guidelines provide science-based guidance on the importance of being physically active to promote health and reduce the risk for chronic diseases. The federal guidelines include the following recommendations.

### Adults between 18 and 64 Years of Age

- Adults should do 150 minutes a week of moderate-intensity aerobic (cardiorespiratory) physical activity, 75 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity (also see Chapter 6). When combining moderate- and vigorous-intensity activities, a person could participate in moderate-intensity activity twice a week for 30 minutes and high-intensity activity for 20 minutes on another two days. Aerobic activity should be performed in episodes of at least 10 minutes long each, preferably spread throughout the week.
- Additional health benefits are provided by increasing to 5 hours (300 minutes) a week of moderate-intensity aerobic physical activity, 2 hours and 30 minutes a week of vigorous-intensity physical activity, or an equivalent combination of both.
- Adults should also do muscle-strengthening activities that involve all major muscle groups on two or more days per week.

### Older Adults (ages 65 and older)

- Older adults should follow the adult guidelines. If this is not possible due to limiting chronic conditions, older adults should be as physically active as their abilities allow. They should avoid inactivity. Older adults should do exercises that maintain or improve balance if they are at risk of falling.

### Children 6 Years of Age and Older and Adolescents

- Children and adolescents should do 1 hour (60 minutes) or more of physical activity every day. Most of the 1 hour or more a day should be either moderate- or vigorous-intensity aerobic physical activity.
- As part of their daily physical activity, children and adolescents should do vigorous-intensity activity at least three days per week. They also should do muscle-strengthening and bone-strengthening activities at least three days per week.

### Pregnant and Postpartum Women

- Healthy women who are not already doing vigorous-intensity physical activity should get at least 150 minutes of moderate-intensity aerobic activity a week. Preferably, this activity should be spread throughout the week. Women who regularly engage in vigorous-intensity aerobic activity or high amounts of activity can continue their activity provided that their condition remains unchanged and they talk to their health care provider about their activity level throughout their pregnancy.

All reports agree that any amount of physical activity that exceeds the minimum recommendations provided here for adults between 18 and 64 years of age provides even greater benefits and is recommended for individuals who wish to further improve personal fitness, reduce the risk for chronic disease and disabilities, prevent premature mortality, or prevent unhealthy weight gain.

**Critical Thinking**

Do you consciously incorporate physical activity throughout the day into your lifestyle? Can you provide examples? Do you think you get sufficient daily physical activity to maintain good health?

## Healthy People 2020

In addition to releasing the *Physical Activity Guidelines for Americans* and the *Dietary Guidelines for Americans* to the public every 10 years, the U.S. Department of Health and Human Services releases objectives to encourage collaborations across government sectors and agencies to take action to prevent disease and promote health. Since 1979, the *Healthy People* initiative has set and monitored national health objectives to meet a broad range of health needs, guided individuals toward making informed health decisions, helped eliminate health disparities between groups of people, and measured the impact of prevention activity. The objectives address three important points[26]:

1. *Personal responsibility for healthy behavior*. Individuals need to become ever more health conscious. Responsible and informed behaviors are the keys to good health.
2. *Health benefits for all people and all communities*. Lower socioeconomic conditions and poor health often are interrelated. Extending the benefits of good health to all people is crucial to the health of the nation.
3. *Health promotion and disease prevention*. A shift from treatment to preventive techniques will drastically cut health care costs and help all Americans achieve a better quality of life.

Developing these health objectives involves more than 10,000 people representing 300 national organizations, including the Institute of Medicine of the National Academy of Sciences, all state health departments, and the federal Office of Disease Prevention and Health Promotion. Figure 1.8

**Figure 1.8 Selected health objectives for the year 2020.**

- Increase the proportion of persons with health insurance, a usual primary care provider, and coverage for clinical preventive services.
- Ensure that all people, including those with illnesses and chronic disability, participate daily in meaningful and freely chosen recreation, leisure, and physical activity, which directly influences well-being and quality of life.
- Reduce the proportion of adults who engage in no leisure-time physical activity.
- Increase the proportion of adolescents and adults who meet current Federal Physical Activity Guidelines.
- Increase the proportion of adults who are at a healthy weight, and reduce the proportion of children, adolescents, and adults who are overweight or obese.
- Reduce coronary heart disease and stroke deaths.
- Reduce the mean total blood cholesterol levels among adults and the proportion of persons in the population with hypertension.
- Increase the proportion of adults aged 20 years and older who are aware of, and respond to, early warning symptoms and signs of a heart attack and stroke.
- Reduce the overall cancer death rate and provide counseling about cancer prevention.
- Reduce the diabetes death rate and the annual number of new cases of diagnosed diabetes in the population.
- Reduce infections caused by key pathogens commonly transmitted through food.
- Increase the proportion of sexually active persons who use condoms.
- Reduce the rate of HIV transmission among adults and adolescents, and reduce the number of deaths resulting from HIV infection.
- Increase the proportion of substance-abuse treatment facilities that offer HIV/AIDS education, counseling, and support.
- Increase school-based health promotion programs available to youth between the ages of 14 and 22 to decrease the rate of sexually transmitted diseases and teen pregnancy and to increase the proportion of adolescents who abstain from sexual intercourse or use condoms if sexually active.
- Reduce tobacco use by adults and adolescents, and reduce the initiation among children, adolescents, and young adults.
- Reduce average annual alcohol consumption, and increase the proportion of adolescents who disapprove of substance abuse.
- Increase the proportion, among persons who need alcohol and/or illicit drug treatment, of those who receive specialized treatment for abuse or dependence.
- Reduce drug-induced deaths.



summarizes the key 2020 objectives. Living the fitness and wellness principles provided in this book will enhance the quality of your life and also will allow you to be an active participant in achieving the Healthy People 2020 Objectives.

## National Physical Activity Plan

Established in 2010, the National Physical Activity Plan calls for policy, environmental, and cultural changes to help all Americans enjoy the health benefits of physical activity specifically. It aims to increase physical activity among all segments of the population. Like *Healthy People 2020*, the plan is a comprehensive private and public sector joint effort to create a culture that supports active lifestyles and enables everyone to meet physical activity guidelines throughout life.

The vision of the plan is that one day all Americans will be physically active, and they will live, work, and play in environments that facilitate regular physical activity. The plan complements the *Federal Physical Activity Guidelines* and the *Healthy People 2020* objectives and comprises recommendations organized in eight sectors of societal influence: education; business and industry; health care; mass media; parks, recreation, fitness, and sports; public health; volunteer and non-profit; and transportation, land use, and community design. Strategies to implement the plan include:

- Developing and implementing policies requiring school accountability for quality and quantity of physical education and physical activity.
- Encouraging early childhood education programs to have children as physically active as possible.
- Providing access to and opportunities for physical activity before and after school.
- Making physical activity a patient "vital sign" (tracking activity levels) that all health care providers assess and discuss with patients.
- Using routine performance measures by local, state, and federal agencies to set benchmarks for active travel (walking, biking, and public transportation).
- Enhancing the existing parks and recreation infrastructure with effective policy and environmental changes to promote physical activity.
- Identifying and disseminating best practice models for physical activity in the workplace.
- Providing tax breaks for building owners or employers who provide amenities in workplaces and support active commuting, including showers in buildings, secure bicycle parking, free bicycles, or transit subsidies.
- Encouraging businesses to implement work policies that allow employees to get some physical activity before, during, or after work hours.

The implementation of the National Physical Activity Plan requires cooperation among school officials, city and county council members, state legislators, corporations, and Congress.

# 1.7 Wellness

Most people recognize that participating in fitness programs improves their quality of life. At the end of the 20th century, however, we came to realize that physical fitness alone was not always sufficient to lower the risk for disease and ensure better health. For example, individuals who run 3 miles (about 5 km) a day, lift weights regularly, participate in stretching exercises, and watch their body weight might be easily classified as

having good or excellent fitness. Offsetting these good habits, however, might be risk factors, including high blood pressure, smoking, excessive daily sitting, excessive stress, drinking too much alcohol, and eating too many foods high in saturated and trans fats. These factors place people at risk for cardiovascular disease and other chronic diseases of which they may not be aware.

Even though most people are aware of their unhealthy behaviors, they seem satisfied with life as long as they are free from symptoms of disease or illness. They do not contemplate change until they incur a major health problem. Nevertheless, present lifestyle habits dictate the health and well-being of tomorrow.

Good health should not be viewed simply as the absence of illness. The notion of good health has evolved considerably and continues to change as scientists learn more about lifestyle factors that bring on illness and affect wellness. Once the idea took hold that fitness by itself would not always decrease the risk for disease and ensure better health, the **wellness** concept followed.

Wellness implies a constant and deliberate effort to stay healthy and achieve the highest potential for well-being. Wellness requires implementing positive lifestyle habits to change behavior and thereby improve health and quality of life, prolong life, and achieve total well-being. Living a wellness way of life is a personal choice, but you may need additional support to achieve wellness goals. Thus, **health promotion** programs have been developed to educate people regarding healthy lifestyles and provide the necessary support to achieve wellness.

For example, you may be prepared to initiate an aerobic exercise program, but if you are not familiar with exercise prescription guidelines or places to exercise safely, or if you lack peer support or flexible scheduling to do so, you may have difficulty accomplishing your goal. Similarly, if you want to quit smoking but do not know how to do it and everyone else around you smokes, the chances for success are limited. To some extent, the environment limits your choices. Hence, the availability of a health promotion program would provide the much-needed support to get started and implement a wellness way of life.

## The Seven Dimensions of Wellness

Wellness has seven dimensions: physical, emotional, mental, social, environmental, occupational, and spiritual (Figure 1.9). These dimensions are interrelated: One frequently affects the others. For example, a person who is emotionally "down" often has no desire to exercise, study, socialize with friends, or attend church, and he or she may be more susceptible to illness and disease.

The seven dimensions show how the concept of wellness clearly goes beyond the absence of disease. Wellness incorporates factors such as adequate fitness, proper nutrition, stress management, disease prevention, spirituality, not smoking or abusing drugs, personal safety, regular physical examinations, health education, and environmental support.

**Figure 1.9 Dimensions of wellness.**




For a wellness way of life, individuals must be physically fit and manifest no signs of disease and they also must be free of risk factors for disease (such as hypertension, hyperlipidemia, cigarette smoking, negative stress, faulty nutrition, careless sex). The relationship between adequate fitness and wellness is illustrated in the continuum in Figure 1.10. Even though an individual tested in a fitness center may demonstrate adequate or even excellent fitness, indulging in unhealthy lifestyle behaviors will still increase the risk for chronic diseases and diminish the person's well-being.

### Physical Wellness

**Physical wellness** is the dimension most commonly associated with being healthy. It entails confidence and optimism about one's ability to protect physical health and take care of health problems.

Physically well individuals are physically active, exercise regularly, avoid uninterrupted bouts of sitting, eat a well-balanced diet, maintain recommended body weight, get sufficient sleep, practice safe sex, minimize exposure to environmental contaminants, avoid harmful drugs (including tobacco and excessive alcohol), and seek medical care and exams as needed. Physically well people also exhibit good cardiorespiratory endurance, adequate muscular strength and flexibility, proper body composition, and the ability to carry out ordinary and unusual demands of daily life safely and effectively.

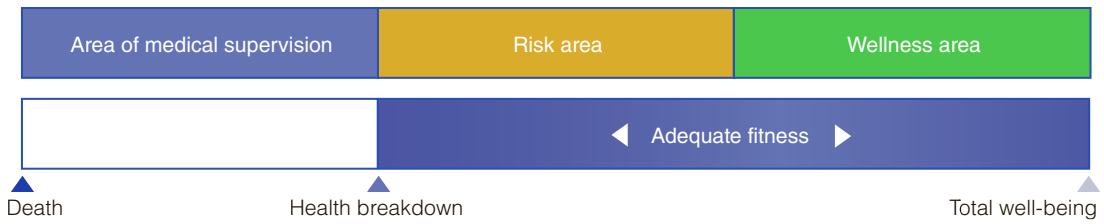
GLOSSARY

**Wellness** The constant and deliberate effort to stay healthy and achieve the highest potential for well-being. It encompasses seven dimensions—physical, emotional, mental, social, environmental, occupational, and spiritual—and integrates them all into a quality life.

**Health promotion** The science and art of enabling people to increase control over their lifestyle to move toward a state of wellness.

**Physical wellness** Good physical fitness and confidence in your personal ability to take care of health problems.

**Figure 1.10 Wellness continuum.**






## Emotional Wellness

**Emotional wellness** involves the ability to understand your own feelings, accept your limitations, and achieve emotional stability. Furthermore, it implies the ability to express emotions appropriately, adjust to change, cope with stress in a healthy way, and enjoy life despite its occasional disappointments and frustrations.

Emotional wellness brings with it a certain stability, an ability to look both success and failure squarely in the face and keep moving along a predetermined course. When success is evident, the emotionally well person radiates the expected joy and confidence. When failure seems evident, the emotionally well person responds by making the best of circumstances and moving beyond the failure. Wellness enables you to move ahead with optimism and energy instead of spending time and talent worrying about failure. You learn from it, identify ways to avoid it in the future, and then go on with the business at hand.

Emotional wellness also involves happiness—an emotional anchor that gives meaning and joy to life. Happiness is a long-term state of mind that permeates the various facets of life and influences our outlook. Although there is no simple recipe for creating happiness, researchers agree that happy people are usually participants in some category of a supportive family unit where they feel loved. Healthy, happy people enjoy friends, work hard at something fulfilling, get plenty of exercise, and enjoy play and leisure time. They know how to laugh, and they laugh often. They give of themselves freely to others and seem to have found deep meaning in life.

An attitude of true happiness signals freedom from the tension and depression that many people endure. Emotionally well people are obviously subject to the same kinds of depression and unhappiness that occasionally plague us all, but the difference lies in the ability to bounce back. Well people take minor setbacks in stride and have the ability to enjoy life despite it all. They don't waste energy or time recounting the situation, wondering how they could have changed it, or dwelling on the past.

## Mental Wellness

**Mental wellness**, also referred to as intellectual wellness, implies that you can apply the things you have learned, create opportunities to learn more, and engage your mind in lively interaction with the world around you. When you are mentally well, you are not intimidated by facts and figures with which you are unfamiliar, but you embrace the chance to learn something new. Your confidence and enthusiasm enable you to approach any learning situation with eagerness that leads to success.

Mental wellness brings with it vision and promise. More than anything else, mentally well people are open-minded and accepting of others. Instead of being threatened by people who are different from themselves, they show respect and curiosity without feeling they have to conform. They are faithful to their own ideas and philosophies and allow others the same privilege. Their self-confidence guarantees that they can take their place among others in the world without having to give up part of themselves and without requiring others to do the same.

## Social Wellness

**Social wellness**, with its accompanying positive self-image, endows you with the ease and confidence to be outgoing, friendly, and affectionate toward others. Social wellness involves a concern for oneself and also an interest in humanity and the environment as a whole.

One of the hallmarks of social wellness is the ability to relate to others and to reach out to other people, both within one's family and outside it. Similar to emotional wellness, it involves being comfortable with your emotions and thus helps you understand and accept the emotions of others. Your own balance and sense of self allow you to extend respect and tolerance to others. Healthy people are honest and loyal. This dimension of wellness leads to the ability to maintain close relationships with other people.

## Environmental Wellness

**Environmental wellness** refers to the effect that our surroundings have on our well-being. Our planet is a delicate **ecosystem**, and its health depends on the continuous recycling of its elements. Environmental wellness implies a lifestyle that maximizes harmony with the earth and takes action to protect the world around us.

Environmental threats include air pollution, chemicals, ultraviolet radiation in the sunlight, water and food contamination, secondhand smoke, noise, inadequate shelter, unsatisfactory work conditions, lack of personal safety, and unhealthy relationships. Health is affected negatively when we live in a polluted, toxic, unkind, and unsafe environment.

Unfortunately, most first-year college students are not concerned about the health of the environment.[27] To enjoy environmental wellness, we are responsible for educating and protecting ourselves against environmental hazards and also

protecting the environment so that we, our children, and future generations can enjoy a safe and clean environment.

Steps that you can take to live an environmentally conscious life include conserving energy (walk to your destination or ride public transportation, do not drive unless absolutely necessary, and turn off lights and computers when not in use); not littering and politely asking others not to do it either; recycling as much as possible; conserving paper and water (take shorter showers and don't let the water run while brushing your teeth); not polluting the air, water, or Earth if you can avoid doing so; not smoking; planting trees and keeping plants and shrubs alive; evaluating purchases and conveniences based on their environmental impact; donating old clothes to Goodwill, veterans' groups, or other charities; and spending leisure time enjoying and appreciating the outdoors. Time spent in natural settings has been clinically shown to improve one's long-term sense of peacefulness, fulfillment, spirituality, and appreciation for nature's wonders.[28]

## Occupational Wellness

**Occupational wellness** is not tied to high salary, prestigious position, or extravagant working conditions. Any job can bring occupational wellness if it provides rewards that are important to the individual. To one person, salary might be the most important factor, whereas another might place much greater value on creativity. Those who are occupationally well have their own "ideal" job, which allows them to thrive.

One school of thought, developed by psychologist Fredrick Herzberg, suggests that the factors of a job that cause dissatisfaction lie on a completely separate continuum than factors that provide satisfaction. Dissatisfaction can be reduced with what Herzberg calls hygiene factors, including a good relationship with supervisors, fair compensation and reasonable company policies; while satisfaction can be improved with motivating factors such as recognition for accomplishments or work the employee finds purposeful and satisfying. A situation where both hygiene and motivating factors are positive results in occupational wellness.

People with occupational wellness face demands on the job, but they also have some say over demands placed on them. Any job has routine demands, but in occupational wellness, routine demands are mixed with new, unpredictable challenges that keep a job exciting. Occupationally well people are able to maximize their skills, and they have the opportunity to broaden their existing skills or gain new ones. Their occupation offers the opportunity for advancement and recognition for achievement. Occupational wellness encourages collaboration and interaction among coworkers, which fosters a sense of teamwork and support.

## Spiritual Wellness

**Spiritual wellness** provides a unifying power that integrates all dimensions of wellness. Basic characteristics of spiritual people include a sense of meaning and direction in life and a relationship to a higher being. Pursuing these avenues may lead to personal freedom, including prayer, faith, love, closeness to others, peace, joy, fulfillment, and altruism.

Several studies have reported positive relationships among spiritual well-being, emotional well-being, and satisfaction with life. Spiritual health is somehow intertwined with physical health. People who attend church and regularly participate in religious organizations enjoy better health, have a lower incidence of chronic diseases, are more socially integrated, handle stress more effectively, and appear to live longer.[29] Other studies have shown that spirituality strengthens the immune system, is good for mental health, prevents age-related memory loss, decreases the incidence of depression, leads to fewer episodes of chronic inflammation, and decreases the risk of death and suicide. For example, can you recall feeling awe and amazement during a time of spirituality, or while taking in a spectacular scene in nature or a beautiful piece of artwork or music? That sense of wonder has been shown to lower inflammation-inducing compounds and increase life expectancy.[30]

**Prayer** is a signpost of spirituality at the core of most spiritual experiences. It is communication with a higher power. At least 200 studies have been conducted on the effects of prayer on health. About two-thirds of these studies have linked prayer to positive health outcomes—as long as these prayers are offered with sincerity, humility, love, empathy, and compassion. Some studies have shown faster healing time and fewer complications in patients who didn't even know they were being prayed for, compared with patients who were not prayed for.[31]

**Altruism**, a key attribute of spiritual people, seems to enhance health and longevity. Studies indicate that people who regularly volunteer live longer. Research has found that health benefits of altruism are so powerful that doing good for others is good for oneself, especially for the immune system.

Researchers believe that there seems to be a strong connection among the mind, spirit, and body. As one improves, the others follow. The relationship between spirituality and wellness

GLOSSARY

**Emotional wellness** The ability to understand your own feelings, accept your limitations, and achieve emotional stability.

**Mental wellness** A state in which your mind is engaged in lively interaction with the world around you.

**Social wellness** The ability to relate well to others, both within and outside the family unit.

**Environmental wellness** The capability to live in a clean and safe environment that is not detrimental to health.

**Ecosystem** A community of organisms interacting with each other in an environment.

**Occupational wellness** The ability to perform your job skillfully and effectively under conditions that provide personal and team satisfaction and adequately reward each individual.

**Spiritual wellness** The sense that life is meaningful, that life has purpose, and that some power brings all humanity together; the ethics, values, and morals that guide you and give meaning and direction to life.

**Prayer** Sincere and humble communication with a higher power.

**Altruism** Unselfish concern for the welfare of others.

Pamela Moore/Getty Images

Altruism enhances health and well-being.

is meaningful in our quest for a better quality of life. As with the other dimensions, development of the spiritual dimension to its fullest potential contributes to wellness. Wellness requires a balance among all seven dimensions.

**Critical Thinking**

Now that you understand the seven dimensions of wellness, rank them in order of importance to you and explain your rationale in doing so.

## 1.8 Longevity and Personal Fitness and Wellness

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.

Furthermore, several studies showed an inverse relationship between physical activity and premature mortality rates. The first major study in this area was conducted in the 1980s among 16,936 Harvard alumni, and the results linked physical activity habits and mortality rates.[32] As the amount of weekly physical activity increased, the risk for cardiovascular deaths decreased. The largest decrease in cardiovascular deaths was observed among alumni who used more than 2,000 calories per week through physical activity.

A landmark study subsequently conducted at the Aerobics Research Institute in Dallas upheld the findings of the Harvard alumni study.[33] Based on data from 13,344 people followed over an average of eight years, the study revealed a graded and consistent inverse relationship between physical activity levels and mortality, regardless of age and other risk factors. As illustrated in Figure 1.11, the higher the level of physical activity, the longer the lifespan.

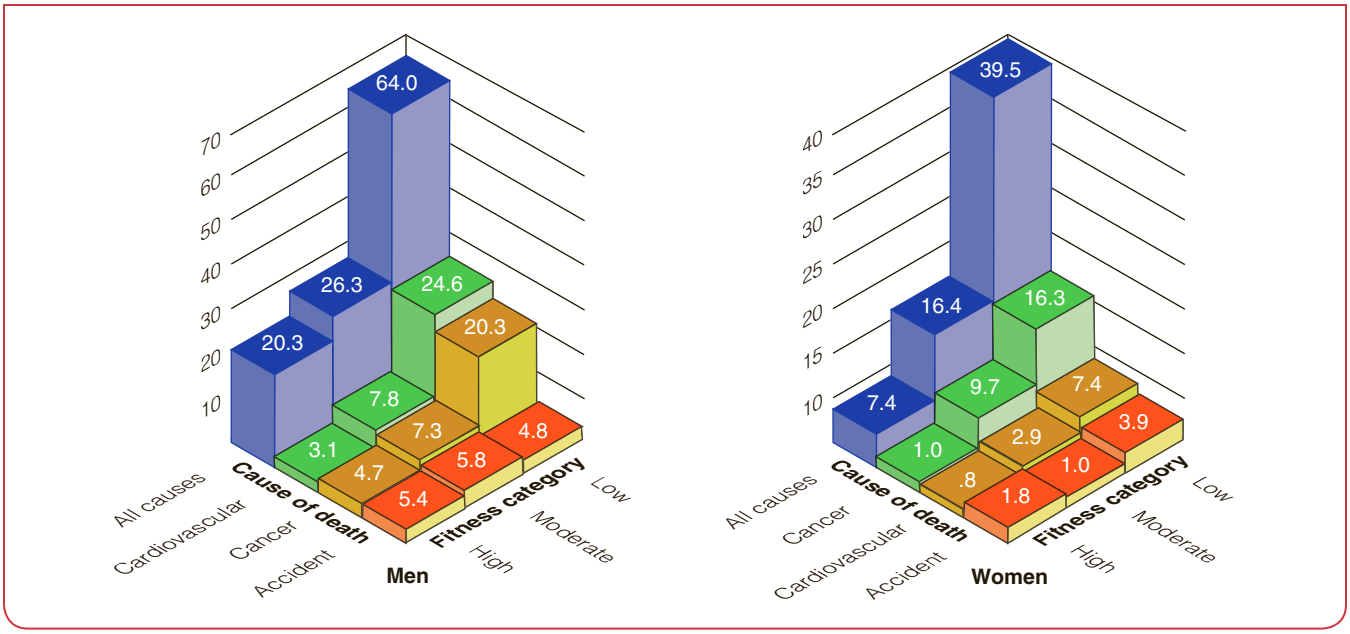
The death rate during the eight-year study from all causes for the low-fit men was 3.4 times higher than that of the high-fit men. For the low-fit women, the death rate was 4.6 times higher than that of high-fit women. A most significant finding of this landmark study was the large drop in all-cause, cardiovascular, and cancer mortality when individuals went from low fitness to moderate fitness—a clear indication that moderate-intensity physical activity, achievable by most adults, does provide considerable health benefits and extends life. The data also revealed that the participants attained more protection by combining higher fitness levels with reduction in other risk factors such as hypertension, serum cholesterol, cigarette smoking, and excessive body fat.

Countless studies since have corroborated the life-saving effects of physical activity, exercise, and healthy lifestyle choices. Of particular interest is a study that, in 2009, looked at four health-related factors among a group of more than 23,000 people.[34] These factors included lifetime nonsmoker, not considered obese (body mass index less than 30), engaging in a minimum of 3.5 hours of weekly physical activity, and adherence to healthy nutrition principles (high consumption of whole-grain breads, fruits, and vegetables and low consumption of red meat). Those who adhered to all four health habits were 78 percent less likely to develop chronic diseases (diabetes, heart disease, stroke, and cancer) during the almost eight-year study. Furthermore, the risk for developing a chronic disease progressively increased as the number of health factors decreased.

A series of studies published in 2012 in the British medical journal *The Lancet* further substantiate the importance of regular physical activity worldwide. In one of the studies[35] it was determined that 1 in 10 deaths is caused by physical inactivity, accounting for more than 5.3 million deaths worldwide. If the inactivity rate were to go down by only 20 percent, more than 1 million lives could be saved on a yearly basis and global life expectancy would increase by almost a year.[36]

A 2013 study looked to specifically compare the efficacy of commonly prescribed drugs against the impact of regular exercise. The data is based on more than 14,000 patients recovering from stroke, being treated for heart failure, or

**Figure 1.11** **Death rates by physical fitness groups.**






looking to prevent type 2 diabetes or a second episode of coronary heart disease. The study looked at the effectiveness of exercise versus drugs on health outcomes. The results were revealing: Exercise programs were more effective than medical treatment in stroke patients and equally effective as medical treatments in patients of diabetes and coronary heart disease. Only in the prevention of heart failure were diuretic drugs more effective in preventing mortality than exercise.

Additional recent studies have found equally impressive results for chronic disease patients who participated in High Intensity Interval Training (see more on High Intensity Interval Training in Chapter 9, pages 327–328) under close physician supervision. In some cases, patients found this demanding workout more manageable and more enjoyable than a traditional workout and researchers found the workout reversed dangerous health conditions.[37] In today's society, a person cannot afford not to participate in a lifetime physical fitness program.

A 2015 study of 334,161 European men and women followed for an average of 12.4 years showed that a little movement goes a long way. Individuals who went from being inactive to only "moderately inactive," saw up to a 30 percent decrease in mortality risk.[38] Participants were only required to burn between 90 and 110 calories through daily physical activity, or the equivalent of a 20-minute brisk walk, to move up to the "moderately inactive" category. Furthermore, twice as many deaths in the study were attributed to lack of physical activity as compared to deaths attributable to obesity. Thus, even small amounts of daily physical activity provided substantial health benefits to people who were otherwise inactive.

While it is clear that moderate-intensity exercise does provide substantial health benefits, research data also show a dose-response relationship between physical activity and health. That is, greater health and fitness benefits occur at higher duration and/or intensity of physical activity. **Vigorous activity** and longer duration are preferable to the extent of one's capabilities because they are most clearly associated with better health and longer life.

Vigorous-intensity exercise seems to provide the best benefits.[39] As compared with prolonged moderate-intensity activity, vigorous-intensity exercise has been shown to provide the best improvements in aerobic capacity, coronary heart disease risk reduction, and overall cardiovascular health.[40]

Further, a comprehensive review of research studies found a lower rate of heart disease in vigorous-intensity exercisers as compared with those who exercised at moderate intensity.[41] While no differences were found in weight loss between the two groups, greater improvements are seen in cardiovascular risk factors in the vigorous-intensity groups, including aerobic fitness, blood pressure, and blood glucose control.

In order to help the public better see exercise for its true benefits, the ACSM and the American Medical Association (AMA) have launched a nationwide "Exercise Is Medicine" program.[42] The initiative is in conjunction with the *Physical Activity Guidelines for Americans*, with the goal of improving

GLOSSARY

**Vigorous activity** Any exercise that requires a MET level equal to or greater than 6 METs (21 mL/kg/min). One MET is the energy expenditure at rest, 3.5 mL/kg/min, and METs are defined as multiples of this resting metabolic rate. (Examples of activities that require a 6-MET level include aerobics, walking uphill at 3.5 mph, cycling at 10 to 12 mph, playing doubles in tennis, and vigorous strength training.)

the health and wellness of the nation through exercise prescriptions from physicians and health care providers. It calls on all physicians to assess and review every patient's physical activity program at every visit. "Exercise is medicine and it's free." All physicians should be prescribing exercise to all patients and participate in exercise themselves. Exercise is considered to be the much-needed vaccine in our era of widespread chronic diseases. As our understanding of human physiology deepens we are continually uncovering new reasons physical activity and exercise are powerful tools that the human body uses for both the treatment and the prevention of chronic diseases and premature death. Additional information on this program can be obtained by consulting the following Web site: www.exerciseismedicine.org. A word of caution, however, is in order. Vigorous exercise should be reserved for healthy individuals who have been cleared for it (Activity 1.3).

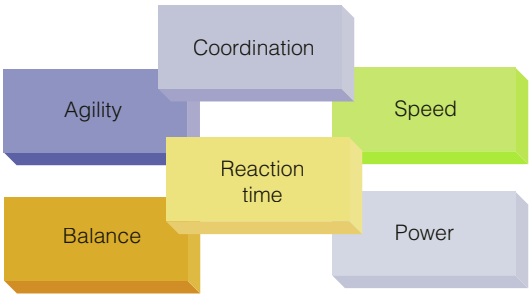
## 1.9 Types of Physical Fitness

As the fitness concept grew at the end of the past century, it became clear that several specific components contribute to an individual's overall level of fitness. **Physical fitness** is classified into health-related and skill-related.

**Health-related fitness** relates to the ability to perform activities of daily living without undue fatigue and is conducive to a low risk of premature **hypokinetic diseases**. The health-related fitness components are cardiorespiratory (aerobic) endurance, muscular fitness (muscular strength and endurance), muscular flexibility, and body composition (Figure 1.12).

**Skill-related fitness** components consist of agility, balance, coordination, reaction time, speed, and power (Figure 1.13). These components are related primarily to successful sports and motor skill performance. Participating in skill-related activities contributes to physical fitness, but in terms of general health promotion and wellness, the main emphasis of physical fitness programs should be on the health-related components.

**Figure 1.13 Motor skill-related components of physical fitness.**






> **Critical Thinking**
>
> What role do the four health-related components of physical fitness play in your life? Rank them in order of importance to you and explain the rationale you used.

### Fitness Standards: Health versus Physical Fitness

A meaningful debate regarding age- and gender-related fitness standards has resulted in two standards: health fitness (also referred to as *criterion referenced*) and physical fitness. Following

**Figure 1.12 Health-related components of physical fitness.**



Good health-related fitness and skill-related fitness are required to participate in highly skilled activities.

More specifically, improvements in the **metabolic profile** (measured by insulin sensitivity, glucose tolerance, and improved cholesterol levels) can be notable despite little or no weight loss or improvement in aerobic capacity. Metabolic fitness can be attained through an active lifestyle and moderate-intensity physical activity.

An assessment of health-related fitness uses **cardiorespiratory endurance** measured in terms of the maximal amount of oxygen the body is able to utilize per minute of physical activity ($VO_{2max}$)—essentially, a measure of how efficiently the heart, lungs, and muscles can operate during aerobic exercise (Chapter 6). $VO_{2max}$ is commonly expressed in milliliters (mL) of oxygen (volume of oxygen) per kilogram (kg) of body weight per minute (mL/kg/min). Individual values can range from about 10 mL/kg/min in cardiac patients to more than 80 mL/kg/min in world-class runners, cyclists, and cross-country skiers.

are definitions of both. The assessment of health-related fitness is presented in Chapters 4, 6, 7, and 8, where appropriate physical fitness standards are included for comparison.

## Health Fitness Standards

The **health fitness standards** proposed here are based on data linking minimum fitness values to disease prevention and health. Attaining the health fitness standard requires only moderate physical activity. For example, a two-mile walk in less than 30 minutes, five or six times a week, seems to be sufficient to achieve the health-fitness standard for cardiorespiratory endurance.

As illustrated in Figure 1.14 and as discussed above, significant health benefits can be reaped with such a program, although fitness improvements, expressed in terms of maximum oxygen uptake, or $VO_{2max}$ (explained next and in Chapter 6), are not as notable. Nevertheless, health improvements are quite striking. These benefits include reduction in blood lipids, lower blood pressure, weight loss, stress release, less risk for diabetes, and lower risk for disease and premature mortality.

GLOSSARY

**Physical fitness** The ability to meet the ordinary as well as unusual demands of daily life safely and effectively without being overly fatigued and still have energy left for leisure and recreational activities.

**Health-related fitness** Fitness programs that are prescribed to improve the individual's overall health.

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

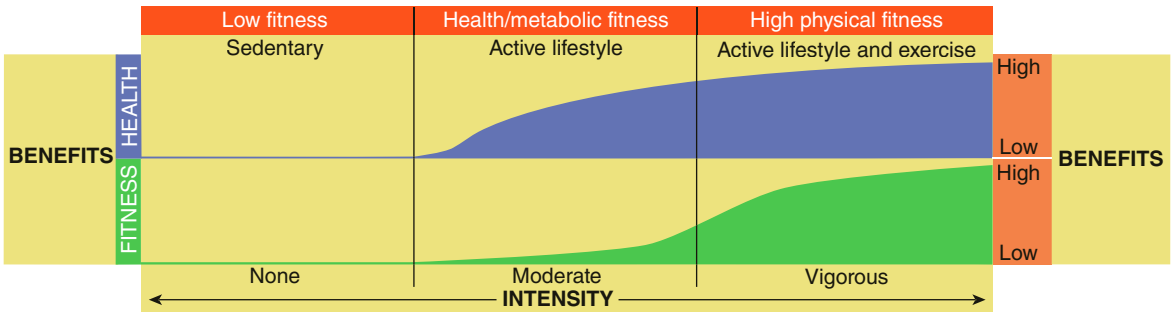
**Skill-related fitness** Fitness components important for success in skillful activities and athletic events; encompasses agility, balance, coordination, power, reaction time, and speed.

**Health fitness standards** The lowest fitness requirements for maintaining good health, decreasing the risk for chronic diseases, and lowering the incidence of muscular-skeletal injuries.

**Metabolic profile** A measurement of plasma insulin, glucose, lipid, and lipoprotein levels to assess risk for diabetes and cardiovascular disease.

**Cardiorespiratory endurance** The ability of the lungs, heart, and blood vessels to deliver adequate amounts of oxygen to the cells to meet the demands of prolonged physical activity.

**Figure 1.14** **Health and fitness benefits based on the type of lifestyle and physical activity program.**



**HOEGER KEY TO WELLNESS**

**Individual $VO_{2max}$ values can range from about 10 mL/kg/min in cardiac patients to more than 80 mL/kg/min in world-class athletes. Aim for values of 35 and 32.5 mL/kg/min to reach health fitness standards and benefit from metabolic fitness.**

Research data from the study presented in Figure 1.11 reported that achieving $VO_{2max}$ values of 35 and 32.5 mL/kg/min for men and women, respectively, may be sufficient to lower the risk for all-cause mortality significantly. Although greater improvements in fitness yield an even lower risk for premature death, the largest drop is seen between the least fit and the moderately fit. Therefore, the 35 and 32.5 mL/kg/min values could be selected as the health fitness standards.

## Physical Fitness Standards

**Physical fitness standards** are set higher than health fitness standards and require a more intense exercise program. Physically fit people of all ages have the freedom to enjoy most of life's daily and recreational activities to their fullest potentials. Current health fitness standards may not be enough to achieve these objectives.

Sound physical fitness gives the individual a degree of independence throughout life that many people in the United States no longer enjoy. Most adults should be able to carry out activities similar to those they conducted in their youth, though not with the same intensity. These standards do not require being a championship athlete, but activities such as changing a tire, chopping wood, climbing several flights of stairs, playing basketball, mountain biking, playing soccer with children or grandchildren, walking several miles around a lake, and hiking through a national park do require more than the current "average fitness" level of most Americans.

## Behavior Modification Planning

### Financial Fitness Prescription

Although not one of the components of physical fitness, taking control of your personal finances is critical for your success and well-being. The sooner you start working on a lifetime personal financial plan, the more successful you will be in becoming financially secure and being able to retire early, in comfort, if you choose to do so. Most likely, you have not been taught basic principles to improve personal finance and enjoy "financial fitness." Thus, start today using the following strategies:

1. *Develop a personal financial plan.* Set short-term and long-term financial goals for yourself. If you do not have financial goals, you cannot develop a plan or work toward that end.
2. *Subscribe to a personal finance magazine or newsletter.* In the same way that you should regularly read reputable fitness/wellness journals or newsletters, you should regularly peruse a "financial fitness" magazine. If you don't enjoy reading financial materials, then find a periodical that is quick and to the point; there are many available. You don't have to force yourself to read the *Wall Street Journal* to become financially knowledgeable. Many periodicals have resources to help you develop a financial plan. Educate yourself and stay current on personal finances and investment matters.
3. *Set up a realistic budget and live on less than you make.* Pay your bills on time and keep track of *all* expenses. Then develop your budget so that you spend less than you earn. Your budget may require that you either cut back on expenses and services or figure out a way to increase your income. Balance your checkbook regularly and do not overdraft your checking account. Remind yourself that satisfaction comes from being in control of the money you earn.
4. *Learn to differentiate between wants and needs.* It is fine to reward yourself for goals that you have achieved (see Chapter 2), but limit your spending to items that you truly need. Avoid simple impulse spending because "it's a bargain" or something you just want to have.
5. *Pay yourself first; save 10 percent of your income each month.* Before you take any money out of your paycheck, put 10 percent of your income into a retirement or investment account. If possible, ask for an automatic withdrawal at your bank from your paycheck to avoid the temptation to spend this money. This strategy may allow you to have a solid retirement fund or even provide for an early retirement. If you start putting away $100 a month at age 20, and earn a modest 6 percent interest rate, at age 65 you will have more than $275,000.
6. *Set up an emergency savings fund.* Whether you ultimately work for yourself or for someone else, there may be uncontrollable financial setbacks or even financial disasters in the future. So, as you are able, start an emergency fund equal to 3 to 6 months of normal monthly earnings. Additionally, start a second savings account for expensive purchases such as a car, a down payment on a home, or a vacation.
7. *Use credit, gas, and retail cards responsibly and sparingly.* As soon as you receive new cards, sign them promptly and store them securely. Due to the prevalence of identity theft (someone stealing your

(*continued*)

creditworthiness), cardholders should even consider a secure post office box, rather than a regular mailbox, for all high-risk mail. Shred your old credit cards, monthly statements, and any and all documents that contain personal information to avoid identity theft. Pay off all credit card debt monthly, and do not purchase on credit unless you have the cash to pay it off when the monthly statement arrives. Develop a plan at this very moment to pay off your debt if you have such. Credit card balances, high interest rates, and frequent credit purchases lead to financial disaster. Credit card debt is the worst enemy to your personal finances!

8. *Understand the terms of your student loans.* Do not borrow more money than you absolutely need for actual educational expenses. Student loans are not for wants but needs (see item 4). Remember, loans must be repaid, with interest, once you leave college. Be informed regarding the repayment process and do not ever default on your loan. If you do, the entire balance (principal, interest, and collection fees) is due immediately and serious financial and credit consequences will follow.
9. *Complete your college education.* The gap is widening between workers who have and have not graduated from college. On average, those whose education ends with their high school diploma bring home a paycheck that is 62 percent of the paycheck of their peers with a bachelor's degree. Even with rising tuition costs, this investment of time and money is a financially sound choice. Of the two-thirds of students who take on student loans to complete their degree, 86 percent agree the degree pays off.
10. *Eat out infrequently.* Besides saving money that you can then pay to yourself, you will eat healthier and consume fewer calories.
11. *Make the best of tax "motivated" savings and investing opportunities available to you.* For example, once employed, your company may match your voluntary 401(k) contributions (or other retirement plan), so contribute at least up to the match (you may use the 10 percent you "pay yourself first"—see item 5—or part of it). Also, under current tax law, maximize your Roth IRA contribution personally. Always pay attention to current tax rules that provide tax incentives for investing in retirement plans. If at all possible, *never* cash out a retirement account early. You may pay penalties in addition to tax, in most situations. As you are able, employ a tax professional or financial planner to avoid serious missteps in your tax planning.
12. *Stay involved in your financial accumulations.* You may seek professional advice, but you stay in control. Ultimately, no one will look after your interests as well as you. Avoid placing all your trust (and assets) in one individual or institution. Spreading out your assets is one way to diversify your risk.
13. *Protect your assets.* As you start to accumulate assets, get proper insurance coverage (yes, even renter's insurance) in case of an accident or disaster. You have disciplined yourself and worked hard to obtain those assets; now make sure they are protected.
14. *Review your credit report.* The best way to ensure that your credit "identity" is not stolen and ruined is to regularly review your credit report, at least once a year, for accuracy.
15. *Contribute to charity and the needy.* Altruism (doing good for others) is good for heart health and emotional well-being. Remember the less fortunate and donate regularly to some of your favorite charitable organizations and volunteer time to worthy causes.

### The Power of Investing Early

Jon and Jim are both 20 years old. Jon begins investing $100 a month starting on his 20th birthday. He stops investing on his 30th birthday (he has set aside a total of $12,000). Jim does not start investing until he's 30. He chooses to invest $100 a month as Jon had done, but he does so for the next 30 years (Jim invests a total of $36,000). Although Jon stopped investing at age 30, assuming an 8 percent annual rate of return in a tax-deferred account, by the time both Jon and Jim are 60, Jon will have accumulated $199,035, whereas Jim will have $150,029. At a 6 percent rate of return, they would both accumulate about $100,000, but Jim invested three times as much as Jon did.

Post these principles of financial fitness in a visible place at home where you can review them often. Start implementing these strategies as soon as you can and watch your financial fitness level increase over the years.



## Which Program Is Best?

Your own personal objectives will determine the fitness program you decide to use. If the main objective of your fitness program is to lower the risk for disease, attaining the health fitness standards will provide substantial health benefits. If, however, you want to participate in vigorous fitness activities, achieving a high

GLOSSARY

**Physical fitness standards** A fitness level that allows a person to sustain moderate-to-vigorous physical activity without undue fatigue and the ability to closely maintain this level throughout life.

physical fitness standard is recommended. This book gives both health fitness and physical fitness standards for each fitness test so that you can personalize your approach.

## 1.10 Benefits of a Comprehensive Fitness Program

An inspiring story illustrating what fitness can do for a person's health and well-being is that of George Snell from Sandy, Utah. At age 45, Snell weighed approximately 400 pounds, his blood pressure was 220/180, he was blind because of undiagnosed diabetes, and his blood glucose level was 487.

Snell had determined to do something about his physical and medical condition, so he started a walking/jogging program. After about eight months of conditioning, he had lost almost 200 pounds, his eyesight had returned, his glucose level was down to 67, and he was taken off medication. Just two months later—less than 10 months after beginning his personal exercise program—he completed his first marathon, a running course of 26.2 miles!

### Health Benefits

Most people exercise because it improves their personal appearance and makes them feel good about themselves. Although many benefits accrue from participating in a regular fitness and wellness program, and active people generally live longer, *the greatest benefit of all is that physically fit individuals enjoy a better quality of life.* These people live life to its fullest, with far fewer health problems than inactive individuals.

The benefits derived by regularly participating in exercise are so extensive that it is difficult to compile an all-inclusive list. Many of these benefits are summarized in Table 1.4. As far back as 1982, the American Medical Association indicated that *"there is no drug in current or prospective use that holds as much promise for sustained health as a lifetime program of physical exercise."* Furthermore, researchers and sports medicine leaders have stated that *if the benefits of exercise could be packaged in a pill, it would be the most widely prescribed medication throughout the world today.*

While most of the chronic (long-term) benefits of exercise are well-established, what many people fail to realize is that there are *immediate benefits* derived by participating in just one single bout of exercise. Most of these benefits dissipate within 48 to 72 hours following exercise. The *immediate benefits,* summarized in Table 1.5, are so striking that it prompted Dr. William L. Haskell of Stanford University to state: *"Most of the health benefits of exercise are relatively short term, so people should think of exercise as a medication and take it on a daily basis."* Of course, as you regularly exercise a minimum of 30 minutes five times per week and maintain a certain amount of physical activity throughout the day, you will realize the impressive long-term benefits listed in Table 1.4.

### Exercise and Brain Function

If the previous benefits of exercise still have not convinced you to start a regular exercise program, you may want to consider the effects of exercise on brain function and academic performance. Physical activity is related to better cognitive health and effective functioning across the lifespan.

**Table 1.4 Long-Term Benefits of Exercise**

Regular participation in exercise:

- improves and strengthens the cardiorespiratory system.
- maintains better muscle tone, muscular strength, and endurance.
- improves muscular flexibility.
- enhances athletic performance.
- helps maintain recommended body weight.
- helps preserve lean body tissue.
- increases resting metabolic rate.
- improves the body's ability to use fat during physical activity.
- improves posture and physical appearance.
- improves functioning of the immune system.
- lowers the risk for chronic diseases and illnesses (including heart disease, stroke, and certain cancers).
- decreases the mortality rate from chronic diseases.
- thins the blood so that it doesn't clot as readily, thereby decreasing the risk for coronary heart disease and stroke.
- helps the body manage blood lipid (cholesterol and triglyceride) levels more effectively.
- prevents or delays the development of high blood pressure and lowers blood pressure in people with hypertension.
- helps prevent and control type 2 diabetes.
- helps achieve peak bone mass in young adults and maintain bone mass later in life, thereby decreasing the risk for osteoporosis.
- helps people sleep better.
- helps prevent chronic back pain.
- relieves tension and helps in coping with life stresses.
- raises levels of energy and job productivity.
- extends longevity and slows the aging process.
- improves and helps maintain cognitive function, decreasing the risk for dementia and Alzheimer's disease.
- promotes psychological well-being, including higher morale, self-image, and self-esteem.
- reduces feelings of depression and anxiety.
- encourages positive lifestyle changes (improving nutrition, quitting smoking, controlling alcohol and drug use).
- speeds recovery time following physical exertion.
- speeds recovery following injury or disease.
- regulates and improves overall body functions.
- improves physical stamina and counteracts chronic fatigue.
- retards creeping frailty, reduces disability, and helps to maintain independent living in older adults.
- enhances quality of life: People feel better and live a healthier and happier life.

**Table 1.5 Immediate (Acute) Benefits of Exercise**

You can expect a number of benefits as a result of a single exercise session. Some of these benefits last as long as 72 hours following your workout. Exercise:

- increases heart rate, stroke volume, cardiac output, pulmonary ventilation, and oxygen uptake.
- begins to strengthen the heart, lungs, and muscles.
- enhances metabolic rate or energy production (burning calories for fuel) during exercise and recovery. (For every 100 calories you burn during exercise, you can expect to burn another 15 during recovery.)
- uses blood glucose and muscle glycogen.
- improves insulin sensitivity (decreasing the risk of type 2 diabetes).
- immediately enhances the body's ability to burn fat.
- lowers blood lipids.
- improves joint flexibility.
- reduces low-grade (hidden) inflammation (see pages 374–375 in Chapter 10).
- increases endorphins (hormones), which are naturally occurring opioids that are responsible for exercise-induced euphoria.
- increases fat storage *in muscle,* which can then be burned for energy.
- improves endothelial function. (Endothelial cells line the entire vascular system, which provides a barrier between the vessel lumen and surrounding tissue—endothelial dysfunction contributes to several disease processes, including tissue inflammation and subsequent atherosclerosis.)
- enhances mood and self-worth.
- provides a sense of achievement and satisfaction.
- decreases blood pressure the first few hours following exercise.
- decreases arthritic pain.
- leads to muscle relaxation.
- decreases stress.
- improves brain function.
- promotes better sleep (unless exercise is performed too close to bedtime).
- improves digestion.
- boosts energy levels.
- improves resistance to infections.



While much of the research is still in its infancy, even in 400 years BC, the Greek philosopher Plato stated: "*In order for man to succeed in life, God provided him with two means, education and physical activity. Not separately, one for the soul and the other for the body, but for the two together. With these two means, man can attain perfection*."

Data on more than 2.4 million students in the state of Texas have shown consistent and significant associations between physical fitness and various indicators of academic achievement; in particular, higher levels of fitness were associated with better academic grades. Cardiorespiratory fitness was shown to have a dose-response association with academic performance (better fitness and better grades), independent of other sociodemographic and fitness variables.[43] Another analysis looked at the short-term boost of exercise on academics. After reviewing the results from 19 different studies of children to young adults, researchers found that students who had 20 minutes of exercise immediately preceding a test or giving a speech had higher academic performance and better focus than those who did not exercise.[44] Exercise has proven to make us more clearheaded.

Emerging research shows that exercise allows the brain to function at its best through a combination of biological reactions. First, exercise increases blood flow to the brain, providing oxygen, glucose, and other nutrients; and improving the removal of metabolic waste products. The increased blood and oxygen flow also prompt the release of the protein Brain-Derived Neurotrophic Factor (BDNF). This protein works by strengthening connections between brain cells and repairing any damage within them. BDNF also stimulates the growth of new neurons in the hippocampus, the portion of the brain involved in memory, planning, learning, and decision-making. The hippocampus is one of only two parts of the adult brain where new cells can be generated. The connections strengthened by BDNF are critical for learning to take place and for memories to be stored. Exercise provides the necessary stimulus for brain neurons to interconnect, creating the perfect environment in which the brain is ready, willing, and able to learn.[45]

Exercise also increases the neurotransmitters dopamine, glutamate, norepinephrine, and serotonin, all of which are vital in the generation of thought and emotion. Low levels of serotonin have been linked to depression, and exercise has repeatedly been shown to be effective in treating depression.

The hippocampus tends to shrink in late adulthood, leading to memory impairment. In older adults, regular aerobic exercise has been shown to increase the size of the hippocampus and decrease the rate of brain shrinkage, dramatically minimizing declines in thinking and memory skills.

Physical activity appears to be the most important lifestyle change a person can make to prevent dementia and Alzheimer's later in life. Aerobics, strength training, and even stretching and toning all have been shown to be beneficial, and researchers are surprised by the strength of the association between exercise and these conditions. An emerging set of new studies is finding that along the entire age spectrum, subjects improve brain function with physical activity and exercise. Additionally, maintaining a high level of physical fitness in mid-life can reduce a person's chances of developing Alzheimer's by half, and dementia by 60 percent.[46]

Keeping the mind engaged with proactive cognitive challenges like reading, studying, playing games, and doing puzzles is critical (but not passive TV watching). Physical activity and exercise, nonetheless, provide better protection than intellectual challenges themselves. Even light-intensity activities of daily living appear to provide protection against cognitive impairment. The research further shows that as the amount of activity increases, the rate of cognitive decline decreases. And the amount of daily activity performed appears to be more important than the intensity itself in terms of warding off dementia.

Of course, greater protection is obtained by combining both physical and cognitive challenges. A 2015 study sought to offer a truly comprehensive health program



No current drug or medication provides as many health benefits as a regular physical activity program.

against cognitive decline in adults who were at risk for dementia. A group of 1,260 adults in Finland ages 60 to 77 participated in a program that employed a full arsenal of healthy lifestyle factors: a sound diet, a balanced fitness training course involving muscular fitness and cardiovascular training, cognitive building exercises, and regular testing of metabolic and vascular health signs. After two years, participants participating in cognitive tests scored 25 percent higher than the control group overall, and even higher in some areas, including a 150 percent superiority in processing speed. The group will continue to be monitored for several years to document their comparative risk for dementia and Alzheimer's.[47]

## Economic Benefits

Sedentary living can have a strong effect on a nation's economy. As the need for physical exertion in Western countries decreased steadily during the past century, health care expenditures increased dramatically. Health care costs in the United States rose from $12 billion in 1950 to $2.9 trillion in 2013 (Figure 1.15), or about 17.4 percent of the country's gross domestic product (GDP). This ratio far outpaces the spending of all other countries in the OECD. The next closest country is the Netherlands, at 11.8 percent, and Canada ranks eighth, at 10.9 percent of GDP (Figure 1.16). In 1980, health care costs in the United States represented 8.8 percent of the United States GDP, and if the current trend continues, they are projected to reach almost 20 percent by 2019. According to the Institute of Medicine, up to a third of health care costs is wasteful or inefficient.

**Figure 1.15 U.S. health care cost increments since 1950.**

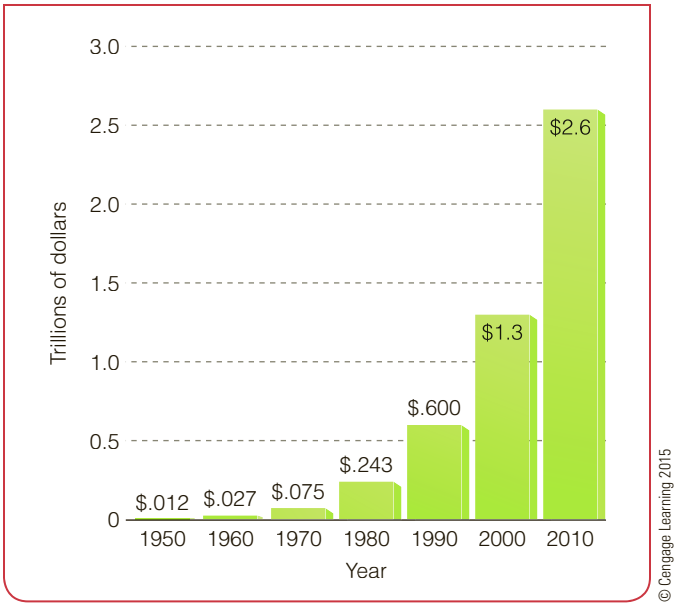
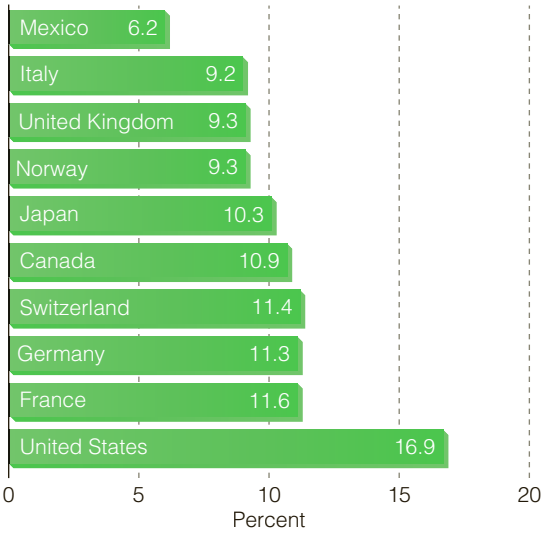




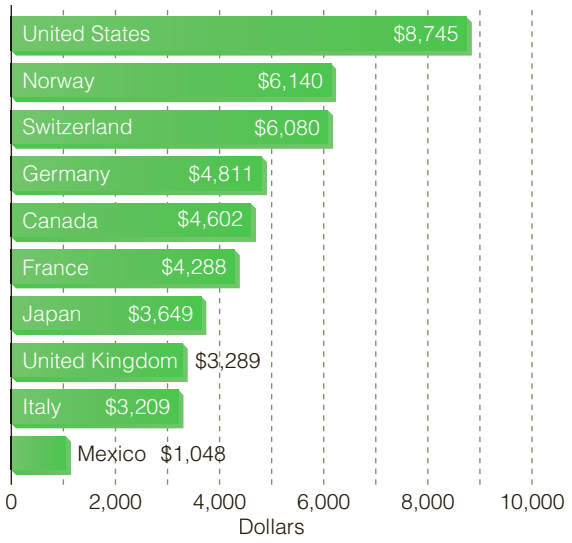

**Figure 1.16 Health care expenditures for selected countries as a percentage of the gross domestic product (GDP), 2014.**




SOURCE: Organisation for Economic Co-operation and Development, 2014.

In terms of yearly health care costs per person, the United States spends more per person than any other industrialized nation. Per capita U.S. health care costs exceed $8,745 per year. These costs are about 2.5 times the OECD average (Figure 1.17). Furthermore, in terms of health care value, the consumer does not have the needed information to make rational decisions. Costs (prices) and care quality are not readily available as in other markets (automobile, housing, groceries). Once sick or ill, the individual seeks medical care without the needed knowledge to make an informed decision. Most often the person does not understand or question unfair medical

**Figure 1.17 Health care expenditure per capita for selected countries, 2014.**




SOURCE: Organisation for Economic Co-operation and Development, 2014.

costs because he/she trusts that health insurance companies will take care of the matter.

One of the reasons for the low overall ranking is the overemphasis on state-of-the-art cures instead of prevention programs. The United States is the best place in the world to treat people once they are sick, but the system does a poor job of keeping people healthy in the first place. Ninety-five percent of our health care dollars are spent on treatment strategies, and less than 5 percent is spent on prevention.

Unhealthy behaviors also contribute to the staggering U.S. health care costs. Risk factors for disease such as obesity and smoking carry a heavy price tag. The yearly medical cost for a person who is obese is $1,429 higher than for a person of normal weight. Looking at the country as a whole, the annual cost of obesity is $147 billion, the cost of smoking $289 billion. Regarding diseases, the annual cost of diabetes is $245 billion, and costs for cardiovascular disease and stroke exceed $320 billion.[48] These figures include direct medical costs as well as lost productivity because of time away from work. As a comparison, the federal education budget is a dwarfed $80.9 billion.

An estimated 1 percent of the people account for 30 percent of health care costs.[49] Half of the people use 84 percent of health care dollars. Without reducing the current burden of disease, real health care reform will not be possible. True health care reform requires a nationwide call for action by everyone against chronic disease.

Scientific evidence links participation in fitness and wellness programs to better health, in addition to lower medical costs and higher job productivity. As a result of the staggering rise in medical costs, many organizations offer health-promotion programs because keeping employees healthy costs less than treating them once they are sick.

## 1.11 *The Wellness Challenge for Our Day*

Because a better and healthier life is something that every person should strive for, our biggest health challenge today is to teach people how to take control of their personal health habits and adhere to a positive lifestyle. A wealth of information on the benefits of fitness and wellness programs indicates that improving the quality and possible length of our lives is a matter of personal choice.

Even though people in the United States believe a positive lifestyle has a great impact on health and longevity, most people do not reap the benefits because they simply do not know how to implement a safe and effective fitness and wellness program. Others are exercising incorrectly and, therefore, are not reaping the full benefits of their program. How, then, can we meet the health challenges of the 21st century? That is the focus of this book—to provide the necessary tools that will enable you to write, implement, and regularly update your personal lifetime fitness and wellness program.

**Critical Thinking**

What are your thoughts about lifestyle habits that enhance health and longevity? How important are they to you? What obstacles keep you from adhering to these habits or incorporating new habits into your life?

### *Wellness Education: Using This Book*

Although everyone would like to enjoy good health and wellness, most people don't know how to reach this objective. Lifestyle is the most important factor affecting personal well-being. Granted, some people live long because of genetic factors, but quality of life during middle age and the "golden years" is more often related to wise choices initiated during youth and continued throughout life. In a few short years, lack of wellness can lead to a loss of vitality and gusto for life, as well as premature morbidity and mortality.

#### A Personalized Approach

Because fitness and wellness needs vary significantly from one individual to another, all exercise and wellness prescriptions must be personalized to obtain the best results. The Wellness Lifestyle Questionnaire in Activity 1.2 will provide an initial rating of your current efforts to stay healthy and well. Subsequent chapters of this book and their respective activities discuss the components of a wellness lifestyle and set forth the necessary guidelines that will allow you to develop a personal lifetime program to improve fitness and promote your own preventive health care and personal wellness.

## Behavior Modification Planning

### Healthy Lifestyle Habits

Research indicates that adherence to the following 12 lifestyle habits will significantly improve health and extend life:

1. **Participate in a lifetime physical activity program and avoid being sedentary for extended periods.** Attempt to accumulate 60 minutes of moderate-intensity physical activity most days of the week. The 60 minutes should include 20 to 30 minutes of aerobic exercise (vigorous-intensity) at least three times per week, along with other routine activities of daily living, and strengthening and stretching exercises two to three times per week. Furthermore, keep moving throughout the day. Do not sit for more than an hour at a time without getting up to move or stretch for five to ten minutes.
2. **Do not smoke cigarettes.** Cigarette smoking is the largest preventable cause of illness and premature death in the United States. If we include all related deaths, smoking is responsible for about 480,000 unnecessary deaths each year.
3. **Eat right.** Eat a good breakfast and two additional well-balanced meals every day. Avoid eating too many calories, processed foods, and foods with a lot of sugar, saturated fat, and salt. Increase your daily consumption of fruits, vegetables, and whole-grain products.
4. **Avoid snacking**. Refrain from frequent high-sugar snacks between meals. Insulin is released to remove sugar from the blood, and frequent spikes in insulin may contribute to the development of diabetes and heart disease.
5. **Maintain recommended body weight through adequate nutrition and exercise**. This is important in preventing chronic diseases and in developing a higher level of fitness.
6. **Sleep 7 to 8 hours every night**.
7. **Lower your stress levels**. Reduce your vulnerability to stress and practice stress management techniques as needed.
8. **Be wary of alcohol**. Drink alcohol moderately or not at all. Alcohol abuse leads to mental, emotional, physical, and social problems.
9. **Surround yourself with healthy friendships.** Unhealthy friendships contribute to destructive behaviors and low self-esteem. Associating with people who strive to maintain good fitness and health reinforces a positive outlook in life and encourages positive behaviors. Mortality rates are much higher among people who are socially isolated.
10. **Be informed about the environment**. Seek clean air, clean water, and a clean environment. Be aware of pollutants and occupational hazards: asbestos fibers, nickel dust, chromate, uranium dust, and so on. Take precautions when using pesticides and insecticides.
11. **Increase education**. Data indicate that people who are more educated live longer. As education increases, so do the number of connections between nerve cells. An increased number of connections help the individual make better survival (i.e., healthy lifestyle) choices.
12. **Take personal safety measures**. Although not all accidents are preventable, many are. Taking simple precautionary measures—such as using seat belts and keeping electrical appliances away from water—lessens the risk for avoidable accidents.

### Try It

Look at the previous list and indicate which habits are already a part of your lifestyle. What changes could you make to incorporate some additional healthy habits into your daily life?

The activities in this book have been prepared on tear-out sheets so that they can be turned in to class instructors. As you study this book and complete the worksheets, you will learn to:

- Implement motivational and behavior modification techniques to help you adhere to a lifetime fitness and wellness program
- Determine whether medical clearance is needed for your safe participation in exercise
- Conduct nutritional analyses and follow the recommendations for adequate nutrition
- Write sound diet and weight-control programs
- Assess the health-related components of fitness
- Write exercise prescriptions for cardiorespiratory endurance, muscular fitness, and muscular flexibility
- Understand the relationship between fitness and aging
- Determine your levels of tension and stress, reduce your vulnerability to stress, and implement a stress management program if necessary
- Determine your potential risk for cardiovascular disease and implement a risk-reduction program
- Follow a cancer risk-reduction program
- Implement a smoking cessation program, if applicable
- Avoid chemical dependency and know where to find assistance if needed
- Learn the health consequences of sexually transmitted infections (STIs), including human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS), and guidelines for preventing STIs

- Write goals and objectives to improve your fitness and wellness and learn how to chart a wellness program for the future
- Differentiate myths from facts about exercise and health-related concepts

## Exercise Safety

Even though testing and participation in exercise are relatively safe for most apparently healthy individuals, the reaction of the cardiovascular system to higher levels of physical activity cannot be totally predicted. Consequently, a small but real risk exists for exercise-induced abnormalities in people with a history of cardiovascular problems, certain chronic conditions, and those who are at higher risk for disease. Among the exercise-induced abnormalities are abnormal blood pressure; irregular heart rhythm; fainting; and, in rare instances, a heart attack or cardiac arrest.

Before you engage in an exercise program or participate in any exercise testing, at a minimum you should fill out the Physical Activity Readiness Questionnaire (PAR-Q & YOU) found in Activity 1.3. Additional information can be obtained by filling out the Health History Questionnaire also given in Activity 1.3. Exercise testing and participation are not wise under some of the conditions listed in this activity and may require a medical evaluation, including a stress electrocardiogram (ECG) test for a few individuals. If you have any questions regarding your current health status, consult your doctor before initiating, continuing, or increasing your level of physical activity.

Now that you are about to embark on a wellness lifestyle program, sit down and subjectively determine where you are at on each of the seven dimensions of wellness. Use Activity 1.5 to help you with this exercise. Record the date at the top of the respective column. Next, write a goal for each wellness dimension to accomplish prior to the end of this course. Also, list three specific objectives that will help you accomplish each goal.

As you continue to study the content of this book, use this same form to monitor your progress. About once a month reassess your status and make adjustments in your specific objectives so you may reach the desired goals. Modifying unhealthy behaviors and developing new positive habits take time. The plan of action that you are about to develop will help you achieve the desired outcomes.

# 1.12 Assessment of Resting Heart Rate and Blood Pressure

Heart rate can be obtained by counting your pulse either on the wrist over the radial artery or over the carotid artery in the neck (Chapter 6, page 216). In Activity 1.4 you will have an opportunity to determine your heart rate and blood pressure and calculate the extra heart rate life years an increase in exercise may produce.

**Table 1.6 Resting Heart Rate Ratings**

| Heart Rate (bpm) | Rating |
|---|---|
| ≤59 | Excellent |
| 60–69 | Good |
| 70–79 | Average |
| 80–89 | Fair |
| ≥90 | Poor |



You may count your pulse for 30 seconds and multiply by 2 or take it for a full minute. The heart rate usually is at its lowest point (resting heart rate) late in the evening after you have been sitting quietly for about half an hour watching a relaxing TV show or reading in bed, or early in the morning just before you get out of bed. Your pulse should have a consistent (regular) rhythm. A pulse that misses beats or speeds up or slows down may be an indication of heart problems and should be followed up by a physician.

Unless you have a pathological condition, a lower resting heart rate indicates a stronger heart. To adapt to cardiorespiratory or aerobic exercise, blood volume increases, the heart enlarges, and the muscle gets stronger. A stronger heart can pump more blood with fewer strokes.

Resting heart rate categories are given in Table 1.6. Although resting heart rate decreases with training, the extent of **bradycardia** depends not only on the amount of training but also on genetic factors. Although most highly trained athletes have a resting heart rate around 40 beats per minute, occasionally one of these athletes has a resting heart rate in the 60s or 70s even during peak training months of the season. For most individuals, however, the resting heart rate decreases as the level of cardiorespiratory endurance increases.

Blood pressure is assessed using a **sphygmomanometer** and a stethoscope. Use a cuff of the appropriate size to get accurate readings. Size is determined by the width of the inflatable bladder, which should be about 80 percent of the circumference of the midpoint of the arm.

Blood pressure usually is measured while the person is in the sitting position, with the forearm and the manometer at the same level as the heart. The arm should be flexed slightly and placed on a flat surface. At first, the pressure is recorded from each arm, and after that from the arm with the highest reading.

The cuff should be applied approximately an inch above the antecubital space (natural crease of the elbow), with the center of the bladder directly over the medial (inner) surface of the arm. The stethoscope head should be applied firmly, but with little pressure, over the brachial artery in the antecubital space.

GLOSSARY

**Bradycardia** Slower heart rate than normal.

**Sphygmomanometer** Inflatable bladder contained within a cuff and a mercury gravity manometer (or aneroid manometer) from which blood pressure is read.



Assessment of resting blood pressure with an aneroid manometer.

To determine how high the cuff should be inflated, the person recording the blood pressure monitors the subject's radial pulse with one hand and, with the other hand, inflates the manometer's bladder to about 30 to 40 mm Hg above the point at which the feeling of the pulse in the wrist disappears. Next, the pressure is released, followed by a wait of about one minute, then the bladder is inflated to the predetermined level to take the blood pressure reading. The cuff should not be overinflated, as this may cause blood vessel spasm, resulting in higher blood pressure readings. The pressure should be released at a rate of 2 to 4 mm Hg per second. As the pressure is released, **systolic blood pressure (SBP)** is recorded as the point where the sound of the pulse becomes audible. The **diastolic blood pressure (DBP)** is the point where the sound disappears. The recordings should be expressed as systolic over diastolic pressure—for example, 124/80.

Whenever possible, blood pressure should be measured in both arms. Readings for both arms will be similar in most people. A large difference in systolic blood pressure between arms, 10 points or more, signals an increased risk for cardiovascular disease. In this case the individual should follow up with a physician to further discuss disease risk and, if necessary, create a prevention plan.

When you take more than one reading, be sure the bladder is completely deflated between readings and allow at least a full minute before making the next recording. The person measuring the pressure also should note whether the pressure was recorded from the left or the right arm. Resting blood pressure ratings are given in Table 1.7.

**Table 1.7 Resting Blood Pressure Guidelines (expressed in mm Hg)**

| Rating | Systolic | Diastolic |
|---|---|---|
| Normal | ≤120 | ≤80 |
| Prehypertension | 120–139 | 80–89 |
| Hypertension | ≥140 | ≥90 |

SOURCE: National Heart, Lung, and Blood Institute.

In some cases, the pulse sounds become less intense (point of muffling sounds) but still can be heard at a lower pressure (50 or 40 mm Hg) or even all the way down to zero. In this situation, the diastolic pressure is recorded at the point of a clear, definite change in the loudness of the sound (also referred to as fourth phase) and at complete disappearance of the sound (fifth phase) (e.g., 120/78/60 or 120/82/0).

## Mean Blood Pressure

During a normal resting contraction/relaxation cycle of the heart, the heart spends more time in the relaxation (diastolic) phase than in the contraction (systolic) phase. Accordingly, mean blood pressure (MBP) cannot be computed by taking an average of the SBP and DBP blood pressures. The equations used to determine MBP are shown in Activity 1.4.

When measuring blood pressure, be aware that a single reading may not be an accurate value because of the various factors (rest, stress, physical activity, food) that can affect blood pressure. Thus, if you are able, ask different people to take several readings at different times of the day to establish the real values. You can record the results of your resting heart rate and your SBP, DBP, and MBP assessments in Activity 1.4. You can also calculate the effects of aerobic activity on resting heart rate in this activity.

GLOSSARY

**Systolic blood pressure (SBP)** Pressure exerted by blood against walls of arteries during forceful contraction (systole) of the heart.

**Diastolic blood pressure (DBP)** Pressure exerted by the blood against the walls of the arteries during the relaxation phase (diastole) of the heart.

# Assess Your Behavior

1. Are you aware of your family health history and lifestyle factors that may negatively impact your health?
2. Do you accumulate at least 30 minutes of moderate-intensity physical activity five days per week and avoid excessive periods of daily sitting?
3. Do you make a constant and deliberate effort to stay healthy and achieve the highest potential for well-being?

## Assess Your Knowledge

Evaluate how well you understand the concepts presented in this chapter using the chapter-specific quizzing available in the online materials at http://www.cengagebrain.com.

1. Advances in modern technology
   a. help people achieve higher fitness levels.
   b. have led to a decrease in chronic diseases.
   c. have almost completely eliminated the necessity for physical exertion in daily life.
   d. help fight hypokinetic disease.
   e. make it easier to achieve good aerobic fitness.
2. Most activities of daily living in the United States help people
   a. get adequate physical activity on a regular basis.
   b. meet health-related fitness standards.
   c. achieve good levels of skill-related activities.
   d. Choices a, b, and c are correct.
   e. None of the choices is correct.
3. The leading cause of death in the United States is
   a. cancer.
   b. accidents.
   c. CLRD.
   d. diseases of the cardiovascular system.
   e. drug abuse.
4. Bodily movement produced by skeletal muscles is called
   a. physical activity.
   b. kinesiology.
   c. exercise.
   d. aerobic exercise.
   e. muscle strength.
5. Among the long-term benefits of regular physical activity and exercise are significantly reduced risks for developing or dying from
   a. heart disease.
   b. type 2 diabetes.
   c. colon and breast cancers.
   d. osteoporotic fractures.
   e. All are correct choices.
6. To be ranked in the "active" category, an adult has to take between
   a. 3,500 and 4,999 steps per day.
   b. 5,000 and 7,499 steps per day.
   c. 7,500 and 9,999 steps per day.
   d. 10,000 and 12,499 steps per day.
   e. 12,500 and 15,000 steps per day.
7. The constant and deliberate effort to stay healthy and achieve the highest potential for well-being is defined as
   a. health.
   b. physical fitness.
   c. wellness.
   d. health-related fitness.
   e. physiological fitness.
8. Research on the effects of fitness on mortality indicates that the largest drop in premature mortality is seen between
   a. the average and excellent fitness groups.
   b. the low and moderate fitness groups.
   c. the high and excellent fitness groups.
   d. the moderate and good fitness groups.
   e. The drop is similar among all fitness groups.
9. Metabolic fitness can be achieved through
   a. a moderate-intensity exercise program.
   b. a high-intensity speed-training program.
   c. an increased basal metabolic rate.
   d. anaerobic training.
   e. an increase in lean body mass.
10. What is the greatest benefit of being physically fit?
    a. absence of disease
    b. a higher quality of life
    c. improved sports performance
    d. better personal appearance
    e. maintenance of recommended body weight

Correct answers can be found at the back of the book.

## Activity 1.2 Wellness Lifestyle Questionnaire

**Name** _____ **Date** _____

**Course** _____ **Section** _____ **Gender** _____ **Age** _____

The purpose of this questionnaire is to analyze current lifestyle habits and help determine changes necessary for future health and wellness. Check the appropriate answer to each question, and obtain a final score according to the guidelines provided at the end of the questionnaire.

| | ALWAYS | NEARLY ALWAYS | OFTEN | SELDOM | NEVER |
|---|---|---|---|---|---|
| 1. I participate in vigorous-intensity aerobic activity for 20 minutes on 3 or more days per week, and I accumulate at least 30 minutes of moderate-intensity physical activity on a minimum of two additional days per week. | 5 | 4 | 3 | 2 | 1 |
| 2. I avoid uninterrupted sitting for more than an hour at a time and accumulate less than 6 hours of sitting time in a 24-hour time period. | 5 | 4 | 3 | 2 | 1 |
| 3. I participate in strength-training exercises, using a minimum of eight different exercises, two or more days per week. | 5 | 4 | 3 | 2 | 1 |
| 4. I maintain recommended body weight (includes avoidance of excessive body fat, excessive thinness, or frequent fluctuations in body weight). | 5 | 4 | 3 | 2 | 1 |
| 5. Every day, I eat three regular meals that include a wide variety of foods. | 5 | 4 | 3 | 2 | 1 |
| 6. I limit the amount of saturated fat and trans fats in my diet on most days of the week. | 5 | 4 | 3 | 2 | 1 |
| 7. I eat a minimum of five servings of fruits and vegetables and six servings from grain products daily. | 5 | 4 | 3 | 2 | 1 |
| 8. I regularly avoid snacks, especially those that are high in calories, sugar, and fat and low in nutrients and fiber. | 5 | 4 | 3 | 2 | 1 |
| 9. I avoid cigarettes or tobacco in any other form. | 5 | 4 | 3 | 2 | 1 |
| 10. I avoid alcoholic beverages. If I drink, I do so in moderation (one daily drink for womenand two for men), and I do not combine alcohol with other drugs. | 5 | 4 | 3 | 2 | 1 |
| 11. I avoid addictive drugs and needles that have been used by others. | 5 | 4 | 3 | 2 | 1 |
| 12. I use prescription drugs and over-the-counter drugs sparingly (only when needed), and I follow all directions for their proper use. | 5 | 4 | 3 | 2 | 1 |
| 13. I readily recognize and act on it when I am under excessive tension and stress (distress). | 5 | 4 | 3 | 2 | 1 |
| 14. I am able to perform effective stress-management techniques. | 5 | 4 | 3 | 2 | 1 |
| 15. I have close friends and relatives with whom I can discuss personal problems and approach for help when needed, and with whom I can express my feelings freely. | 5 | 4 | 3 | 2 | 1 |
| 16. I spend most of my daily leisure time in wholesome recreational activities. | 5 | 4 | 3 | 2 | 1 |
| 17. I sleep seven to eight hours each night. | 5 | 4 | 3 | 2 | 1 |
| 18. I floss my teeth every day and brush them at least twice daily. | 5 | 4 | 3 | 2 | 1 |

**Activity 1.2** **Wellness Lifestyle Questionnaire** *(continued)*

| | ALWAYS | NEARLY ALWAYS | OFTEN | SELDOM | NEVER |
|---|---|---|---|---|---|
| 19. I get "safe sun" exposure (that is, 10–20 minutes unprotected sun exposure to the face, neck, and arms, on most days of the week between hours of 10:00 a.m. and 4:00 p.m.), I avoid overexposure to the sun, and I use sunscreen and appropriate clothing when I am out in the sun for an extended time. | 5 | 4 | 3 | 2 | 1 |
| 20. I avoid using products that have not been shown by science to be safe and effective. (This includes drugs and unproven nutrient and weight loss supplements.) | 5 | 4 | 3 | 2 | 1 |
| 21. I stay current with the warning signs for heart attack, stroke, and cancer. | 5 | 4 | 3 | 2 | 1 |
| 22. I practice monthly breast/testicle self-exams, get recommended screening tests (blood lipids, blood pressure, Pap tests), and seek a medical evaluation when I am not well or disease symptoms arise. | 5 | 4 | 3 | 2 | 1 |
| 23. I have a dental checkup at least once a year, and I get regular medical exams according to age recommendations. | 5 | 4 | 3 | 2 | 1 |
| 24. I am not sexually active. / I practice safe sex. | 5 | 4 | 3 | 2 | 1 |
| 25. I can deal effectively with disappointments and temporary feelings of sadness, loneliness, and depression. If I am unable to deal with these feelings, I seek professional help. | 5 | 4 | 3 | 2 | 1 |
| 26. I can work out emotional problems without turning to alcohol, other drugs, or violent behavior. | 5 | 4 | 3 | 2 | 1 |
| 27. I associate with people who have a positive attitude about life. | 5 | 4 | 3 | 2 | 1 |
| 28. I respond to temporary setbacks by making the best of the circumstances and by moving ahead with optimism and energy. I do not spend time and talent worrying about failures. | 5 | 4 | 3 | 2 | 1 |
| 29. I wear a seat belt whenever I am in a car, I ask others in my vehicle to do the same, and I make sure that children are in an infant seat or wear a shoulder harness. | 5 | 4 | 3 | 2 | 1 |
| 30. I do not drive under the influence of alcohol or other drugs, and I make an effort to keep others from doing the same. | 5 | 4 | 3 | 2 | 1 |
| 31. I avoid being alone in public places, especially after dark; I seek escorts when I visit or exercise in unfamiliar places. | 5 | 4 | 3 | 2 | 1 |
| 32. I seek to make my living quarters accident-free, and I keep doors and windows locked, especially when I am home alone. | 5 | 4 | 3 | 2 | 1 |
| 33. I try to minimize environmental pollutants, and I support community efforts to minimize pollution. | 5 | 4 | 3 | 2 | 1 |
| 34. I use energy conservation strategies and encourage others to do the same. | 5 | 4 | 3 | 2 | 1 |
| 35. I study and/or work in a clean environment (including avoidance of secondhand smoke). | 5 | 4 | 3 | 2 | 1 |
| 36. I participate in recycling programs for paper, cardboard, glass, plastic, and aluminum. | 5 | 4 | 3 | 2 | 1 |