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LIFETIME PHYSICAL FITNESS & WELLNESS

A PERSONALIZED PROGRAM

SIXTEENTH EDITION

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Lifetime Physical Fitness and Wellness: A Personalized Program, 16e
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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 a serious threat to our health that increases the deterioration rate of the human body and leads to premature illness and mortality.

People in the U.S. 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 45 percent of the adults in the U.S. do not meet the recommended guidelines for aerobic and muscular fitness activities, thereby placing themselves at risk for premature morbidity, injury, and early death.

Furthermore, the energy (caloric) expenditure that used to result from activities other than planned daily exercise and basic bodily functions (known as nonexercise activity thermogenesis or NEAT) has also substantially decreased during the last century. Examples of these activities include standing and walking while performing tasks, yard work, housecleaning, gardening, taking stairs, walking to and from stores or offices, using a bicycle as the primary mode of transportation, and so on. NEAT used to represent a major portion of daily energy expenditure.

Currently, people spend about eight hours per day or more of their waking time sitting. Excessive sitting is unnatural to the body and is detrimental to human health. 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 in order to enjoy good health and quality of life over a now longer lifespan. The 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 reaped only 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),* a *Real Life Story,* and a *Personal Profile* based on the chapter contents to pique the reader's 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. Like 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 lifestyles and their understanding of the chapter contents through ten 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 this 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 students 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 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 16th Edition

All chapters in the 16th edition 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, sports medicine conferences, and the reviewers of the 15th edition. In addition to selected new photographs, figures, and insert boxes, the following are the most significant changes to this edition.

Chapter Updates

Chapter 1: Physical Fitness and Wellness

- Updating of all facts and statistics according to the latest research
- Several redesigned figures to enhance content retention
- Updated *Guidelines for Physical Activity* based on its 2nd edition released by the federal government in late 2018
- Modified health history questionnaire to include key questions related to virus infections
- Conformity of the blood pressure assessment with the 2019 American Heart Association guidelines for the proper measurement of blood pressure

Chapter 2: Behavior Modification

- Editing of the *Living in a Toxic Health and Fitness Environment* and *Planning and Willpower* sections and their reduction in size
- An updated introduction and information focusing on personalized values
- A new figure illustrating readiness to change that is based on the student's own confidence and motivation
- With the current trend toward learning outcomes in higher education, a SMART Goals section that teaches students to write goals with a wellness outcome in mind

Chapter 3: Nutrition for Wellness

- Editorial changes throughout the chapter update nutrition concepts based on current research and reports in the field
- Updated key nutrient concerns
- Inclusion of the new *Nutrition Facts Label* with U.S. recommended Daily Values
- New information on milk: whole dairy versus reduced fat dairy; omega fatty acids; unprocessed, processed, and ultra-processed foods; super foods; phytonutrients; soy products; nuts; and probiotics
- Updates to the *Vegetarianism*, *Nutrient Supplementation*, *Antioxidants*, *Vitamin D*, *Organic Foods*, *Bone Health and Osteoporosis*, and *Genetically Modified Crops* sections

Chapter 4: Body Composition

- New information is provided in the assessment of body composition through bioelectrical impedance, body mass index, waist circumference, and current obesity trends

Chapter 5: Weight Management

- The most recent data tables on the incidence of overweight and obesity in the U.S., published by the Centers for Disease Control and Prevention (CDC)
- Updates to all of the following sections: *The Diet Craze*, *Mindful Eating Versus Distracted Eating*, *Metabolism and Lean Body Mass*, *Adjusting Your Fat Intake*, *Sleep and Weight Management*, and *Weight Loss Strategies*
- New content on the *Flexitarian Diet* and *Intermittent Fasting Diet*
- Inclusion of *Foods That Boost Satiety*

Chapter 6: Cardiorespiratory Endurance

- Expanded discussion on the *Responders Versus Nonresponders* section to include information on the importance of intensity and frequency of exercise to experience physiological benefits
- Enhanced content on the *Guidelines for Developing Cardiorespiratory Endurance* and the variables that govern exercise prescription
- New physical activity pyramid figure
- Enhanced discussion on *Physical Stillness: A Deadly Proposition*

Chapter 7: Muscular Fitness

- An update on the mounting evidence of strength training on decreasing all-cause and cancer-related deaths
- Up-to-date dietary guidelines for strength and muscular development
- Expanded information on *Core Strength-Training*, including antiextensors, antilateral flexors, and antirotators principles.
- New strength-training exercises

Chapter 8: Muscular Flexibility

- Revised *Benefits of Good Flexibility* section
- Replacement of the Shoulder Rotation Test with the Finger Touch Test for ease of administration

- An update to the sections on *Preventing and Rehabilitating Low Back Pain*, *Causes of Low Back Pain*, *When to Call a Physician*, and *Surgery*
- New flexibility exercises

Chapter 9: Personal Fitness Programming

- Simplified chapter contents to enhance readability
- Enhanced section on *Exercise in Cold Water*
- Updated guidelines for exercise during pregnancy and contraindications to exercise during pregnancy

Chapter 10: Preventing Cardiovascular Disease

- Up-to-date data on the prevalence of cardiovascular disease
- Updates to the self-assessment coronary heart disease risk factor analysis
- Condensed versions of several coronary heart disease risk factors
- Addition of information on the role of metabolic equivalents (MET level) on cardiovascular health and longevity and on the importance of physical activity throughout the day to the *Physical Inactivity* risk factor for coronary heart disease
- Enhanced, updated, and simplified explanation for the *Abnormal Cholesterol Profile* risk factor for cardiovascular disease
- An updated section on *Metabolic Syndrome*
- Several updates in the *Hypertension* section, including new guidelines from the American Heart Association and the American College of Cardiology for the prevention, detection, evaluation, and management of blood pressure, as well as the role of aerobic and strengthening exercises on blood pressure
- Additional information in the section on other, lesser known potential risk factors for coronary heart disease, including resting heart rate, sleep, and emotional distress

Chapter 11: Cancer Prevention

- Inclusion of the latest figures on the U.S. incidence and death rates for major cancer sites
- Updated figures on the estimates of the relative role of the major cancer-causing factors
- Enhanced discussion on current guidelines for cancer prevention
- New information on the effects of exercise on cancer risk, aspirin and cancer risk, sugar and cancer, alcohol and cancer, and body weight and cancer
- Updates to the *Cancer Questionnaire: Assessing Your Risks*
- 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 insert box on *The Power of Positivity*
- Expanded information on the *Sleep Management* section, including stages of sleep, health effects of sleep deprivation, tips for better sleep, and sleeping drugs
- Enhanced information on *Characteristics of Good Stress Managers*

Chapter 13: Addictive Behavior

- New figures reflecting data specific to addictive behaviors most prevalent in college students, including marijuana, heroin, and alcohol abuse
- Updated data on 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
- Enhanced information on the addictive, physiological effects, and trends of caffeine intake
- Expanded contents on *Nonmedical Use of Prescription Drugs*
- Expanded information on *Marijuana* use and new information on the *Legalization of Marijuana*, its use and trends
- Additional information on the use of electronic cigarettes

Chapter 14: Preventing Sexually Transmitted Infections

- New data on the unprecedented rise of new cases of chlamydia, gonorrhea, and syphilis—now reaching an all-time high in the U.S.
- Updated STI screening recommendations for sexually active adults according to CDC guidelines
- New and updated data and graphs on the prevalence of STIs according to the latest data from the CDC
- Updated HPV vaccination schedule recommendations for adolescents according to recently published CDC guidelines

Chapter 15: Lifetime Fitness and Wellness

- Updates to the *Life Expectancy and Physiological Age Prediction Questionnaire* and to the *Complementary and Alternative Medicine* and *Personal Trainers* sections

Additional Course Resources

- **Health MindTap™ for *Lifetime Physical Fitness & Wellness*.** 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 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 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.
- **Instructor Companion Site.** Additional instructor resources for this product are available online. Instructor assets include an Instructor's Manual, Educator's Guide, PowerPoint® slides, and a test bank powered by Cognero®. Sign up or sign in at www.cengage.com to search for and access this product and its online resources.
- **Cengage Learning Testing Powered by Cognero.** Cengage Teaming Testing Powered by Cognero is a flexible, online system that allows you to:
  - author, edit, and manage test bank content from multiple Cengage Teaming solutions.
  - create multiple test versions in an instant.
  - deliver tests from your TMS, your classroom, or wherever you want.

Brief Author Biographies

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

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

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

Using his knowledge and personal experiences, Dr. Hoeger writes engaging, informative books that thoroughly address today's fitness and wellness issues in a format accessible to students. Since 1990, he has been the most widely read fitness and wellness college textbook author in the U.S. He has published a total of 66 editions of his nine fitness- and wellness-related titles. Among the textbooks written for Wadsworth/Cengage Learning are *Principles and Labs for Fitness and Wellness: A Personalized Program,* 15th edition; *Fitness & Wellness,* 14th edition; *Principles and Labs for Physical Fitness,* 10th edition; *Wellness: Guidelines for a Healthy Lifestyle,* 4th edition; and *Water Aerobics for Fitness & Wellness,* 4th edition (with Terry-Ann Spitzer Gibson).

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

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

Monique Saenz, BYUH

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she now participates in a variety of fitness activities to enjoy good health and maintain a high quality of life.

Husband and wife have been jogging and strength-training together for more than 44 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."

Cherie I. Hoeger received her degree in English with an emphasis in editing for publication. She has been working for 16 years 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). She joined Fitness & Wellness, Inc. in 2014 as a writer and scientific literature reviewer. She took on a more significant role as a coauthor in 2016. Her work has greatly enhanced the excellent quality of the *Fitness & Wellness* textbooks. She is a firm believer in living a healthy and wellness lifestyle, regularly attends professional meetings in the field, and is an active member of the American College of Sports Medicine.

the same event. In 2006, at the age of 52, he was the oldest competitor at the Winter Olympics in Turin, Italy. At different times and in different distances (800 m, 1,500 m, and the mile) in 2012, 2014, 2015, 2016, 2017, 2018, 2019, and 2020, Dr. Hoeger reached All-American standards for his age group by USA Track and Field (USATF). In 2015, he finished third in the one-mile run at the USATF Masters Indoor Track and Field National Championships, and third and fourth, respectively, in the 800- and 1,500-meter events at the Outdoor National Senior Games. In 2016, he advanced to the finals in both the 800 m and the 1,500 m at the World Masters Track and Field Championships held in Perth, Australia. He finished seventh (out of 12 finalists) in the 800 m and eighth (out of 16 finalists) in the 1,500 m. Most recently, in 2019, he finished second in the 800 m at the USATF Masters Outdoor Track and Field Championships and won the gold medal in the 800 m and 5K, and the silver medal in the 1,500 m and 3,000 m at the Hunstman World Senior Games in St. George, Utah.

Sharon A. Hoeger is vice president of Fitness & Wellness, Inc., of Boise, Idaho. Sharon received her degree in computer science from Brigham Young University. In the 1980s, she served as a computer science instructor at The University of Texas of the Permian Basin. She is extensively involved in the research process used in retrieving the most current scientific information that goes into the revision of each textbook. She is also the author of the software that was written specifically for the fitness and wellness textbooks. Her innovations in this area since the publication of the first edition of *Lifetime Physical Fitness & Wellness* in 1986 set the standard for fitness and wellness computer software used in this market today.

Sharon is a coauthor of five of the seven fitness and wellness titles. She also served as *chef de mission* (chief of delegation) for the Venezuelan Olympic Team at the 2006 Winter Olympics in Turin, Italy. A former gymnast,

Andrew D. Meteer received a degree in exercise science and has worked for several years as a personal trainer at Equinox Sports Club in New York City. An active member of the American College of Sports Medicine, Andrew brings vast experience in exercise programming for a diverse

Courtesy of Ricardo Raschini

population and expertise with fitness trends in business and community settings. His excellent writing skills and up-to-date research-based knowledge in the field further strengthen market-leading fitness and wellness concepts presented in this book.

Acknowledgments

This edition is dedicated to Blake Hansen. His kindness, unconditional support, and exceptional skills will be forever appreciated. We would like to thank Christine Kuzma and Mackenzie Malach for their kind assistance with additional photography for this 16th edition. Also, the completion of the 16th 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 15th edition; their valuable comments and suggestions are most sincerely appreciated.

Reviewers for the 16th edition:

Dr. Vicki Boye, Concordia University

Carl Bryan, Central Carolina Community College

Jessica Buel, Clackamas Community College

Lisa Chaisson, Houston Community College

Dr. Karen Dennis, Illinois State University

Amy Howton, Kennesaw State University

Cynthia Karlsson, Virginia Polytechnic Institute and State University

Dr. Jerome Kotecki, Ball State University

Dr. Justin Kraft, Missouri Western State University

Linda J. Romaine, Raritan Valley Community College

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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.

Image Source/Getty Images

Physical Fitness and Wellness

OBJECTIVES

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

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

1.3 **Monitor** your daily physical activity.

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

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

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

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

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

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

1.10 **Assess** resting heart rate and blood pressure.

FAQ

Why should I take a fitness and wellness course?

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

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

Regular participation in a sound physical fitness program will provide substantial health benefits and significantly decrease the risk of many chronic diseases. And although good fitness often motivates people to adopt 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 to 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.

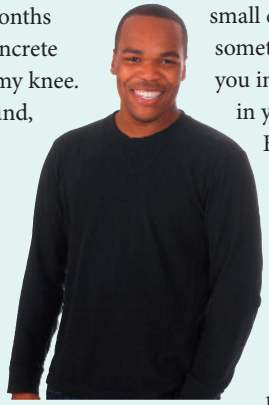
Modern-day conveniences lull people into a sedentary lifestyle.

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

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 get only three to four hours of sleep a night. At times I would pull an "all-nighter," and at other times I would crash and sleep for 12 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 were 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 that, just as 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

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

Personal Profile — General Understanding of Fitness and Wellness

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

I. What have you done to make yourself aware of potential risk factors in your life that may increase your chances of developing disease? What do you know about your family's health history? Is there any other information that you feel you need to know?

II. Do you know the top two leading causes of death in your age group? What steps do you take to protect yourself and set a good example for others?

III. When are you most physically active throughout the day? Is there a season of the year or day of the week when you are most active? What can you do to become more active on a regular basis?

IV. Of the seven dimensions of wellness, which dimension do you ignore most? Which dimension do you follow best?

V. What steps are you taking toward financial wellness?

Take a moment to consider whether the choices from the past week, repeated over years, would accumulate to promote wellness or to cause disease. Your health is a product of complex intertwined physical, mental, inherited, and environmental factors that directly influence your state of wellness. This book will help you navigate through the factors that influence your

behavior and will provide you with the necessary tools to make changes that are right for your life. We will begin this chapter by looking at the big picture and will then use a personalized approach throughout the book to help you create a program aimed at helping you develop a lifetime fitness and wellness lifestyle.

1.1 The Wellness Challenge for You Today

Three basic factors determine our health and longevity: genetics, the environment, and our behavior. In most cases, we cannot change our genetic circumstances, though the budding field of epigenetics is showing us that select genes can be switched on and off by lifestyle choices and environment. (For a more in-depth discussion on epigenetics see "Epigenetics" in Chapter 11.) We can certainly, however, exert control over the environment and our health behaviors so that we may reach our full physical potential based on our genetic code (see Figure 1.1).

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

The underlying causes of death attributable to leading **risk factors** in the U.S. (Figure 1.3) indicate that most factors are related to the lifestyle choices we make. 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 1.4). Thus, the individual controls as much as 80 percent of his or her vulnerability to disease—and thus quality of life. In essence, most people in the U.S. are threatened by the very lives they lead today.

Figure 1.1 Factors that affect health and longevity.

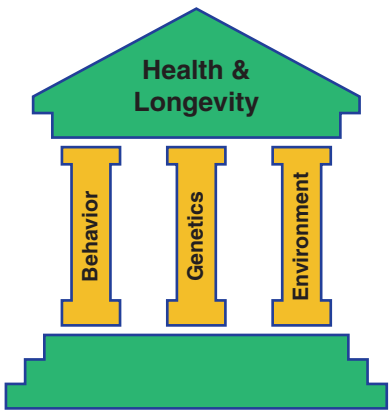
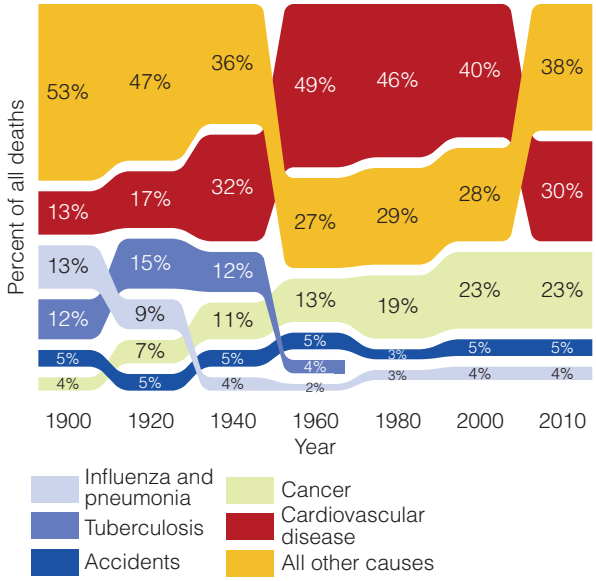
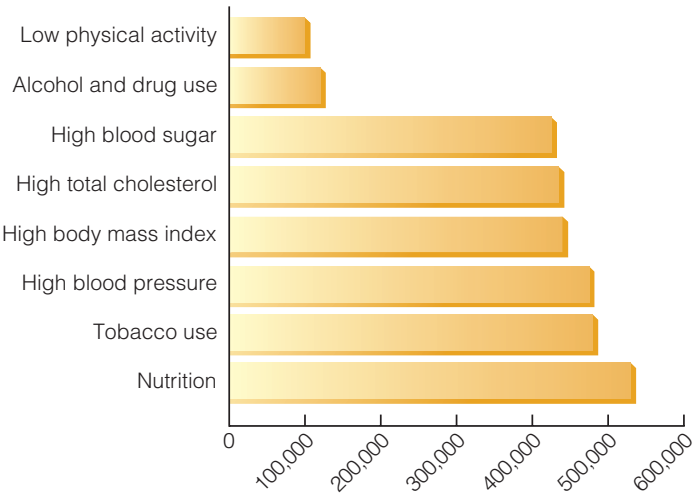


Figure 1.2 Causes of death in the U.S. for selected years.



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

Figure 1.3 Estimated number of deaths attributable to lifestyle-related risk factors for men and women in the U.S.



SOURCE: C. J. L. Murray et al., "The State of US Health, 1990–2016: Burden of Disease, Injuries, and Risk Factors Among US States," *Journal of the American Medical Association* 319 (2018): 1444–1472.

As our culture has adopted the ease of Western life, we have undergone profound cultural shifts at a rapid pace. By comparison, advances in past centuries were slow and gradual. Within the last century we have made wide-reaching changes like overhauling our diet to include more processed, refined, sugary, and unhealthy fatty foods. We have become increasingly **sedentary**. We have changed our social interactions so that we are now always online or "plugged in." While it is impossible to completely tease out every cultural shift and its impact on health, we

know for certain that some take a heavy toll on our population's overall health and wellness. We will begin by examining one of the most impactful cultural shifts. Let's consider the recent history of physical activity.

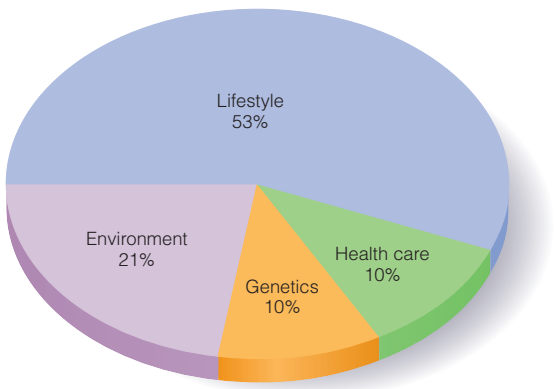
Movement is a basic function for which the human body was created, but advances in technology have almost completely eliminated the necessity for physical exertion in daily life. Scientific findings have shown that physical inactivity and a negative lifestyle seriously threaten health and hasten the deterioration rate of the human body. Most nations, both developed and developing, are experiencing an epidemic of physical inactivity. In the U.S., physical inactivity is the second greatest threat to public health (after tobacco use) and is often referenced in new concerns about *sitting disease,* **sedentary death syndrome (SeDS)**, and **hypokinetic diseases**.

As the populations of the world have adopted a more sedentary lifestyle, the world has seen a steep incline in obesity rates. Before 1980, obesity rates throughout the world remained relatively steady. Then, beginning in the 1980s, obesity rates started to grow rapidly, especially in the U.S., Australia, and England. Worldwide, obesity currently claims triple the number of victims as malnutrition. Overweight and obese people are now the majority in the 34 countries that make up the Organization for Economic Cooperation and Development (OECD).[1]

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

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

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



1.2 Life Expectancy

Currently, the average life expectancy in the U.S. is 78.7 years (76.2 years for men and 81.2 years for women).[2] While the U.S. was once a world leader in life expectancy, over recent years, the increase in life expectancy in the U.S. has not kept pace with that of other developed countries. Based on 2018 data from the World Health Organization (WHO), the U.S. ranks 64th in the world for life expectancy (see Figure 1.5).[3] Japan ranks first in the world with an overall life expectancy of 84.2 years.

Several factors may account for the current U.S. life expectancy ranking, including the extremely poor health of some groups. The U.S. also has fairly high levels of violence (notably, homicides), rates of traffic fatalities, and suicide rates.[4] The current trend is a widening disparity between those in the U.S. with the highest and lowest life expectancy. For example, males in Fairfax County, Virginia, can expect to live as long as males in Japan, whereas those in Bolivar County, Mississippi, have the same life expectancy as males in countries with much lower life expectancies, like Pakistan. People with low socioeconomic status often lead more stressful lives, have more dangerous jobs, have less access to healthy food, are more likely to be exposed to environmental toxins, and live in neighborhoods that are not as safe or as conducive to physical activity. In addition to having lower life expectancy, people with low socioeconomic status spend more of their final years in disability. A healthy lifestyle, on average, adds 5 to 6 years of being disability free.[5]

The Gender Gap in Life Expectancy

Life expectancy for men in the U.S. is 5 years lower than for women. For years it had been assumed that the difference is based on biology, but we are learning that most likely the gender gap is related to lifestyle behaviors most commonly observed in men. Around 1980, the gender gap in life expectancy was almost 8 years. The decrease in the gender gap is thought to be due to the fact that women are increasingly taking on jobs, habits, and stressors of men, including drinking and employment outside the home. Women with heavy work schedules, however, are at

GLOSSARY

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

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

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

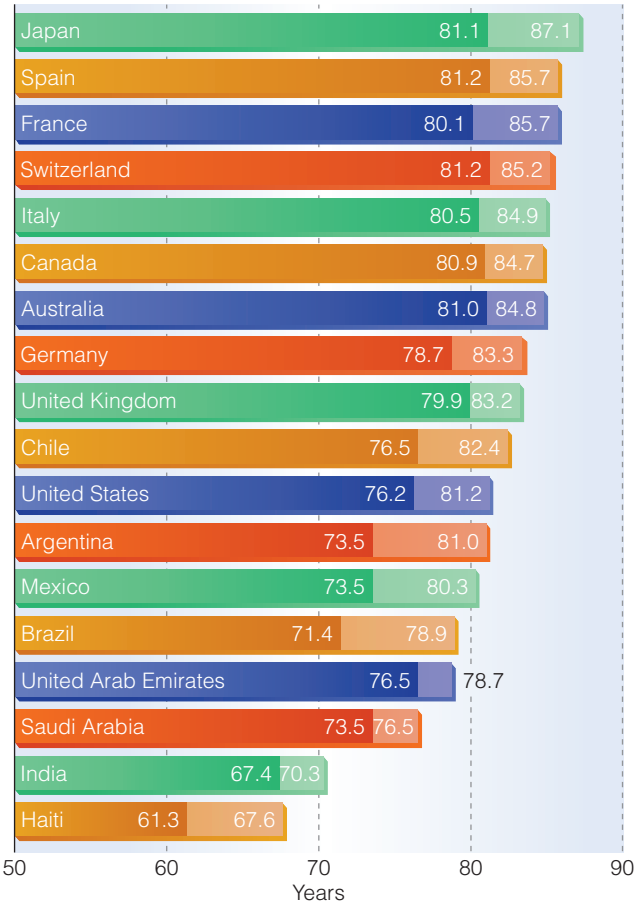
Sedentary Description of a person who is relatively inactive and whose lifestyle is characterized by a lot of sitting.

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

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

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

Figure 1.5 2018 life expectancy at birth for selected countries.



*Dark color is men; light color is women.

SOURCE: World Health Organization, "Life Expectancy and Healthy Life Expectancy. Data by country, 2018." http://apps.who.int/gho/data/view.main.SDG2016LEXv?lang=en; U. S. Department of Health and Human Services, Centers for Disease Control and Prevention, "*Mortality in the United States, 2018,*" No. 355, January 2020.

higher risk than men who have similar work schedules when it comes to heart disease, cancer, and diabetes—most likely because women tend to take on additional stressors at home.[6] Women and men are also becoming more similar to one another in their risk factors for heart disease, such as obesity and diabetes.

Men, nonetheless, still report higher stress on the job and are less likely to engage in stress management programs. Men also work in some of the most dangerous jobs (logging workers, fishers and related fishing workers, aircraft pilots and flight engineers, roofers). In terms of work-related deaths, the fatality rate for men is about ten times that of women.[7] Furthermore, men's health is not given the same degree of attention in terms of public health policies. Thus, men need to take a more proactive role in managing their own health, yet, unfortunately, this can be hard for them.

"Masculinity" itself is also partially to blame. Studies have consistently shown that men are less likely to visit a physician when something is wrong and are less likely to have preventive care visits to be screened for potential risk factors such as hypertension, elevated cholesterol, diabetes, obesity, substance abuse, and depression or anxiety.[8] 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.[9]

The Need to Prevent Disease, Not Only Cure It

The U.S. has not invested the same resources in preventing disease as it has in treating disease after onset. Ninety-five percent of our health care dollars are spent on treatment strategies, and less than 5 percent are spent on prevention. The latest data indicate that one in four adults in the U.S. have at least two chronic conditions and that most of these patients do not receive the preventative recommendations to avoid disease.[10]

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

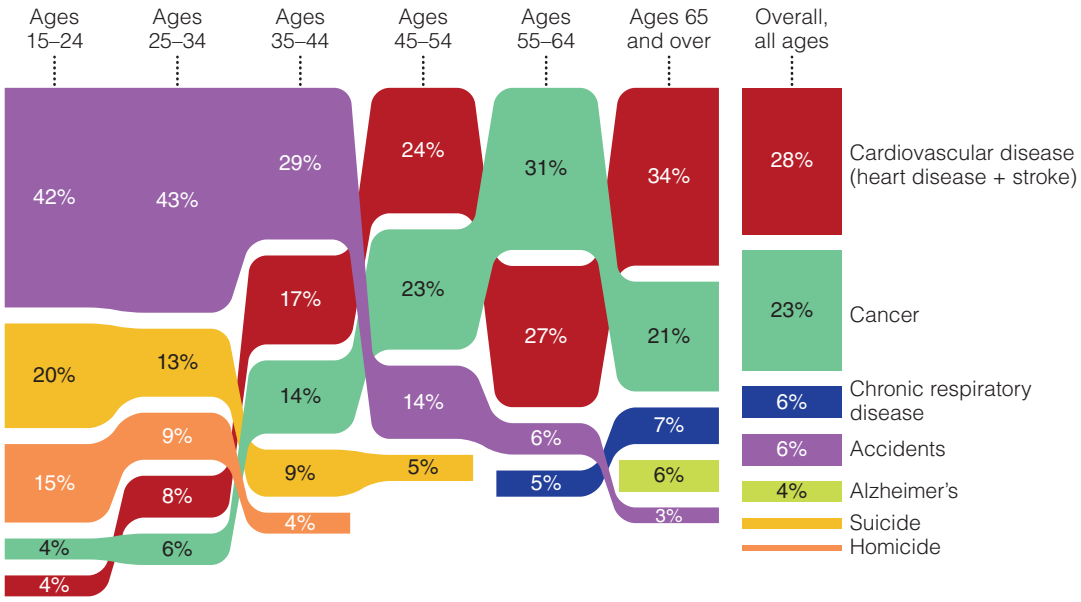
1.3 Leading Health Problems in the U.S.

The leading causes of death in the U.S. today are largely related to lifestyle and personal choices (Figure 1.6). The U.S. Centers for Disease Control and Prevention have found that 7 of 10 Americans die of preventable chronic diseases. Specifically, about 52 percent of all deaths in the U.S. are caused by cardiovascular disease (30.4 percent) and cancer (21.3 percent). A majority of these deaths could be prevented through a healthy lifestyle program. The third and fourth leading causes of death across all age groups, respectively, are chronic lower respiratory disease and accidents (from the age of 1 to 44, accidents are the leading cause of death, with automobile accidents being the leading cause of death in the 5 to 24 age group).[14]

Hoeger Key To Wellness

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

Figure 1.6 Leading causes of death in the U.S. by age.



SOURCE: Centers for Disease Control and Prevention, "Deaths: Final Data for 2017"

Healthy Habits That Cut the Risk for Serious Disease

According to the Centers for Disease Control and Prevention, five 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.
- Reduce the amount of time you spend sitting each day.

Diseases of the Cardiovascular System

The most prevalent degenerative diseases in the U.S. are those of the cardiovascular system. The umbrella of **cardiovascular diseases** includes such conditions as **coronary heart disease (CHD)**, **heart attacks,** and **strokes** (sometimes referred to as brain attacks because like heart attacks, strokes occur when oxygen-rich blood is blocked from reaching cells). According to the American Heart Association (AHA), more than one in three adults in the U.S. are afflicted with diseases of the cardiovascular system, including hypertension (high blood pressure) and CHD. (Many of these people have more than one type of cardiovascular disease.) As we gained understanding of the effects of lifestyle on chronic disease, more people participated in wellness programs, and cardiovascular mortality rates dropped. The decline began in about 1963, and between 1969 and 2018, the incidence of heart disease dropped by approximately 70 percent and the incidence of stroke by about 80 percent.[15] This decrease is credited to

GLOSSARY

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

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

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

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

higher levels of wellness and better treatment modalities in the U.S. A complete cardiovascular disease prevention program is outlined in Chapter 10.

Cancer

The second overall leading cause of death in the U.S. is cancer. Cancer is closing the gap to soon become the leading cause of death in the U.S. One reason for this change may be that increased rates of obesity lead to increased risk for both cancer and cardiovascular disease, but treatment for cardiovascular disease is not as difficult and complex as cancer treatment. About 21 percent of all deaths in the U.S. are attributable to cancer.[16]

The major contributor to the increase in the incidence of cancer deaths during the past five decades is lung cancer, most of it caused by tobacco use. 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.[17]

The American Cancer Society maintains that the most influential factor in fighting cancer today is prevention through health education programs. Lifestyle choices at a young age affect cancer risk throughout a lifetime. A comprehensive cancer-prevention program is presented in Chapter 11.

Chronic Lower Respiratory Disease

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

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

Accidents

Accidents are the fourth overall leading cause of death and the leading cause of death until age 44. Even though not all accidents are preventable, many are. Consider automobile accidents, the leading cause of death for teens. Across the U.S., fewer than 15 percent of people taking trips in automobiles choose not to wear seatbelts, yet these people account for half of all automobile deaths. As for the cause of automobile accidents themselves, fatal accidents are often related to failure to stay in the correct lane or yield the right of way due to driver distraction or alcohol use.[18]

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

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

With the advent of cell phones, distracted driving accidents have climbed. For teens specifically, more than half of all moderate to severe automobile accidents result from driver distraction.[19]. Research utilizing brain imaging has uncovered the cognitive workload and collision risk during multiple driving scenarios (see "Distracted Driving").

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

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

Recently, attention been brought to the number of deaths that are a direct result of medical error in U.S. hospitals. When cause of death is recorded by the Centers for Disease Control and Prevention (CDC), medical error is not offered as an option; however, an estimated 250,000 each year are the result of a mistake of omission or commission by medical workers.[20] While nothing can guarantee perfect medical care, it is ideal for every hospitalized patient to have an attentive and vocal advocate, and of course to lead a wellness lifestyle to avoid preventable health complications in the first place.

1.4 Physical Activity Affects Health and Quality of Life

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

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

Distracted Driving

Automobile accidents are the number one cause of death for teens in the U.S. 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.* The risk is identical for a hands-free device and a handheld phone.
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.
4. *Having a conversation with an adult passenger is safer than having a conversation on a cell phone.* Passengers who are experienced drivers help the driver by pausing conversation and by pointing out cues as needed. For a teen driver, the incidence of collision resulting in death increases with the number of teen passengers.
5. *Though crash risk is lower when talking with a passenger, cognitive workload can be the same as when talking on a cell phone*. Topic of conversation and emotional involvement affect safety in both types of conversation.
6. *The brain does not multitask but rather switches attention between tasks*. Some dual tasks do not cause a problem; others do. When driving and holding a conversation, the brain often recognizes conversation as the primary task. Switching is a complex process that requires events to be committed to short-term memory before they can be "encoded," the stage when the brain chooses what to "see." It is not uncommon for switching time to be tenths of a second, the difference of several car lengths when braking. This is termed "reaction time switching costs."
7. *The brain remains somewhat distracted for up to 27 seconds following a phone conversation, text, or voice technology interaction*.[a]

AAA Foundation for Traffic Safety

8. *Because the majority of trips do not involve a situation that requires split-second timing, drivers can gain a false sense of security about being able to multitask*.
9. *Making a left turn while talking on a cell phone or hands-free device is among the most dangerous driving activities*.
10. *Reaching for a moving object or turning in your seat increases collision incidence by eight to nine times*.
11. *Texting while driving increases collision incidence by 16 times*. Compared with texting, talking on a cell phone is done by drivers more frequently for longer lengths of time, and so is the cause of more deaths than texting is. Consider using your phone's do-not-disturb setting or an app that blocks texting while driving. Because our minds are social and curious, we find text alerts difficult to ignore. Pedestrians who are distracted by their phones also increase their chances of incurring a car accident on the street.
12. *Sleepy drivers kill more than half as many Americans as drunk drivers*. More than 6,000 people die each year in the U.S. in crashes attributed to drowsy drivers. In comparison, roughly 10,000 people die each year because of drunk or buzzed driving.
13. *Parents driving children are just as likely to talk on the phone and use distractions, including navigation systems, as other drivers*.[b]

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

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

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

Furthermore, several landmark 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.[21] As the amount of weekly physical activity increased, the risk for cardiovascular deaths decreased.

GLOSSARY

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

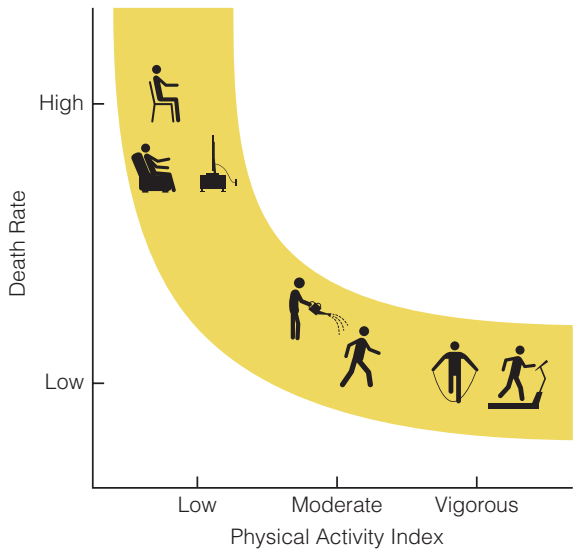
A major second study subsequently conducted at the Aerobics Research Institute in Dallas upheld the findings of the Harvard alumni study.[22] Based on data from 13,344 people followed over an average of 8 years, the study revealed a graded and consistent inverse relationship between physical activity levels and mortality, regardless of age and other risk factors. 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, provides considerable health benefits and extends life. This relationship between physical activity and premature mortality is illustrated in Figure 1.7. 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 upheld these results and have established that as physical activity increases, overall mortality rate decreases. Research has also corroborated that the biggest drop in mortality rate happens when inactive people become moderately active.

One study looked to specifically compare the efficacy of commonly prescribed drugs against the impact of regular exercise. The data are based on more than 14,000 patients recovering from stroke, being treated for heart failure, or looking to prevent type 2 diabetes or a second episode of CHD. 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 prevention of diabetes and CHD. Only in the prevention of heart failure were diuretic drugs more effective in preventing mortality than exercise.

When physical activity is combined with other healthy lifestyle factors, it becomes clear that individual lifestyle choice is the strongest predictor of longevity. In particular, regular daily physical activity, never using tobacco in any form, healthy nutrition, and maintenance of recommended body weight are among the most significant health factors a person can adopt to prevent chronic disease and premature mortality.

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. Current recommendations suggest that a person accumulate a minimum of 150 minutes of moderate-intensity physical activity each week. For an inactive person, following this guideline is the most important step toward improving health. Once a person is regularly achieving this weekly minimum, the next step toward improving health through physical activity is to replace at least one-third of weekly moderate physical activity with vigorous physical activity.[23] Further, there is no increase in mortality risk when people participate in a large volume of moderate- or vigorous-intensity activity each week. Benefits in decreased mortality risk continue to increase until a person reaches three to five times the recommended weekly minimum of 150 minutes, at which point, benefits in decreased mortality risk plateau.[24] As compared with prolonged moderate-intensity activity, vigorous-intensity exercise has been shown to provide the best improvements in aerobic capacity, CHD risk reduction, and overall cardiovascular health. 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).

Figure 1.7 Cardiovascular and cancer death rates by physical activity index.



Exercise Is Medicine

In order to help the public better appreciate the true benefits of exercise, the American College of Sports Medicine (ACSM) and the American Medical Association (AMA) provide a nationwide "Exercise Is Medicine" program.[25] The initiative 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 participating in exercise themselves. Currently, physicians and other professionals in the health field receive little training in exercise science and its practical clinical application. The prevalent approach of largely ignoring exercise in the health profession is an outdated way of practicing medicine.

1.5 Additional Benefits of a Comprehensive Fitness Program

Regular physical activity 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.

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 8 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 2 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 regular fitness, 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 1.1. 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 a single bout of exercise. Most of these benefits dissipate within 48 to 72 hours following exercise. The immediate benefits, summarized in Table 1.2, are so striking that they 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 1.1.

Exercise and Brain Function

Exercise changes the way we learn. Many scientists believe that exercise alters the chemistry of the brain to make it more receptive and malleable while learning. Physical activity is related to better cognitive health and effective functioning across the lifespan. Even in 400 BCE, 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 have shown a consistent and significant association 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. A review of 19

Table 1.1 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.
- decreases the risk of falls.
- enhances quality of life: People feel better and live a healthier and happier life.

Table 1.2 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:

- immediately enhances mood and self-worth.
- 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).
- rapidly enhances the body's ability to burn fat.
- lowers blood lipids.
- improves joint flexibility.
- reduces low-grade (hidden) inflammation (see 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.)
- 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, including an ability to focus.
- promotes better sleep (unless exercise is performed too close to bedtime).
- improves digestion.
- boosts energy levels.
- improves resistance to infections.

different studies of children to young adults looked at the short-term boost of exercise on academics and 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.[26]

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 and able to learn.

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

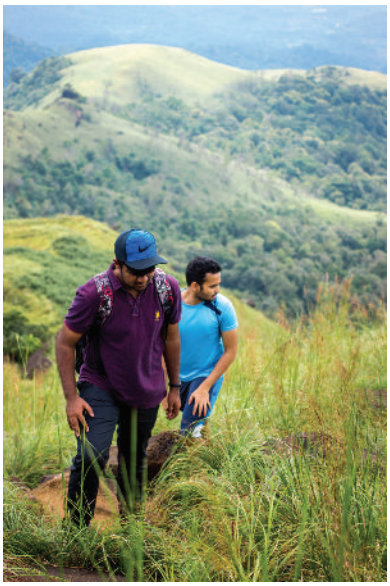


Photo by Vikas Shankarathota

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Photo by Jeffrey F Lin

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

decrease the rate of brain shrinkage, dramatically minimizing declines in thinking and memory skills. One study found that older adults who followed a regular program of moderate to intense exercise had the cognitive and memory skills that rated a decade younger than sedentary peers of the same age.[27] Physical activity, especially in middle and older age, appears to be the most important lifestyle change a person can make to prevent dementia and Alzheimer's.[28]

1.6 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 for way too many hours each day. 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 indicates that too much sitting is hazardous to human health and has a direct link to premature mortality. 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.

The data indicate that the risks that come with sitting are independent from those related to physical activity levels. They suggest that, 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 individuals who exercise five times per week for at least 30 minutes per session but otherwise spend most of the day sitting are accruing health risks.

Prolonged sitting is a major risk factor for disease. Excessive sitting leads to the development of metabolic problems, including reduced insulin sensitivity and increased abdominal fat.[29]

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. Arteries lose flexibility and have a lower capacity to expand and relax. Slower blood flow means less oxygen and glucose delivered to the brain and body, and, as a result, cognitive function declines and the feeling of fatigue increases. Additionally, during extended sitting, fat deposits accumulate in muscle cells, which interferes with insulin's ability to transport glucose into muscle cells. (When a person is active, **skeletal muscles** are responsible for 80 percent of glucose disposal.) Thus, insulin resistance increases along with the accompanying risk for diabetes and cardiovascular disease. When you are sitting, the level of triglycerides (a type of fat found in your blood) jumps because inactive muscles also stop producing the enzyme lipoprotein lipase that usually captures these fats from the blood to turn them into fuel. Even HDL cholesterol levels (the good cholesterol) drop by 20 percent after as little as 1 hour of uninterrupted sitting.

When we are sitting, some of the largest muscles in our body, including leg and hip muscles, are relaxed and inactive. By simply standing up, we immediately activate these muscles. They work to keep us upright, requiring blood sugar to fuel themselves. They further release the enzyme that captures triglycerides from the blood to help keep cholesterol levels in check and also help regulate other metabolic processes. The simple act of repeatedly standing and moving throughout the day can change disease risk. Further, remaining inactive following meals makes blood glucose levels spike. A slow stroll after a meal can cut this blood glucose spike in half. Inactivity further appears to switch on or off dozens of genes that trigger additional risk factors.

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:

- Too much sitting can speed biological aging by up to 8 years.
- People who spend most of their day sitting have as much as a 50 percent greater risk of dying prematurely from all causes. 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 is an underestimated risk factor for cancer. Too much sitting has been estimated to cause 91,000 cancer deaths each year in the U.S. alone (49,000 breast cancers and 42,000 colon cancers).
- Less sitting means greater comfort. Individuals who reduce sitting time throughout the day report feeling less fatigued and more energetic, focused, productive, and comfortable and reported less back and neck pain.

Most people do not realize how much time they spend sitting on a given day. Think about the seats you sit in every day and how much time you spend in each (see Figure 1.8). We can easily accumulate 8 to 12 sitting hours and spend the majority of our day in the seated position, with only the chair beneath us changing.

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

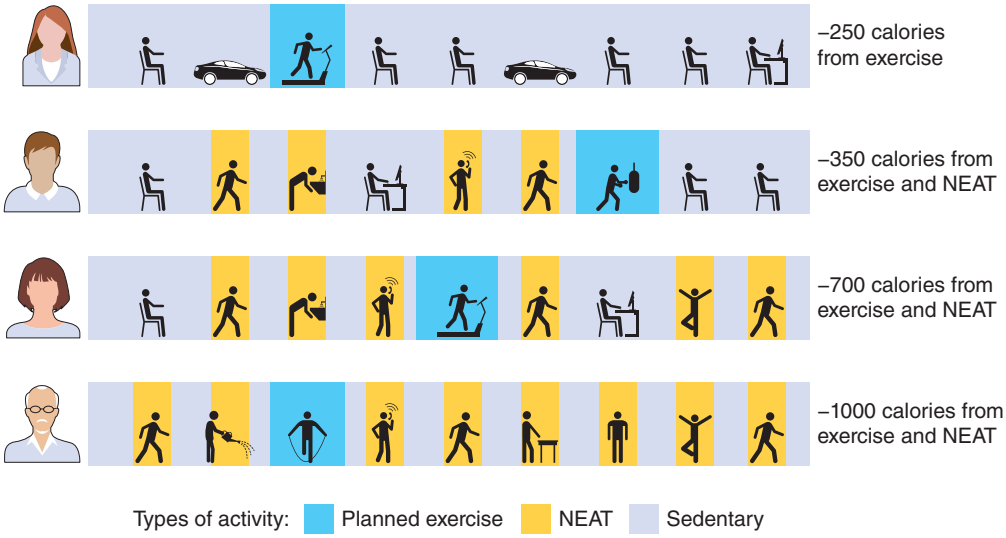
Hoeger Key To Wellness

By being more active throughout the day and avoiding excessive sitting, people can increase their daily energy (caloric) expenditure by the equivalent of a 7-mile run. They will also increase years of healthy life expectancy.

GLOSSARY

Skeletal muscle The type of muscle that powers body movement.

Figure 1.8 The importance of nonexercise activity thermogenesis (NEAT) and exercise.



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

when you have limited time and space, look for opportunities to increase daily physical activity:

- Walk or bike instead of drive for short distances.
- Park farther or get off public transit several blocks from the campus or office. At the office, walk to the farthest bathroom rather than the nearest.
- Take a short walk after each meal or snack. Stand up and move for 1 minute every time you take a drink of water.
- Walk faster than usual.
- Take the stairs often.
- When watching a show, stand up and move during each commercial break, or even better, stretch or work out while watching. When working or watching a show, 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.
- Do not shy away from housecleaning chores or yard work, even for a minute or two at a time.
- Stand more while working/studying. Place your computer on an elevated stand or shelf.
- Make it a habit to stand or pace while talking on the phone.
- Make it a habit to walk or pace when you need to puzzle through a problem. Put to work the advice of the western philosopher Friedrich Nietzsche: "All truly great thoughts are conceived while walking."
- Break up sitting by closing your office door, if possible, and spending 1 minute doing a full-body exercise, such as holding a plank position or doing slow squats into and out of your chair.
- When you accomplish a difficult task at work or while during homework, stand up and give yourself a mini victory parade or victory dance.
- When reading a book, get up and move after every 6 to 10 pages of the book.

- Use a stability ball for a chair. Such use enhances body stability, balance, and abdominal, low back, and leg strength.
- Whenever feasible, walk while conversing or holding meetings. If meetings are in a conference room, take the initiative to stand. Make telephone conference calls an opportunity for a stroll.
- Walk to classmates' homes or coworkers' offices to study or discuss matters with them instead of using your phone.

Researchers are still working to come to a consensus about the ideal prescription of activity to break up sitting. The best current guideline seems to be to stand and move after every 20 minutes of inactivity and to take intermittent 5- to 10-minute breaks for every hour that you are at the computer or studying or participating in any type of uninterrupted sitting. Stretching, walking around, or talking to others while standing or walking is beneficial and increases oxygen flow to the brain, making you more effective, creative, and productive.

1.7 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, doing 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. Physical activity can be of light intensity or moderate to vigorous intensity. Examples of daily **light physical activity** include walking to and from work, taking the stairs instead of elevators and escalators, grocery shopping, and doing household chores. Physical inactivity, by contrast, implies a level of activity that is lower than that required to maintain good health.

Extremely light expenditures of energy throughout the day used to walk casually, perform self-care, or do other light work like emptying a dishwasher are of far greater significance in our overall health than we once realized. We now understand the impact of accumulating constant/small movements. 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. A person may expend 1,300 calories on an average day 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 a planned exercise session. As a result, NEAT is extremely critical for keeping daily energy balance in check. Especially when beginning or intensifying an exercise program, some individuals tend to adjust other activities of daily living, so they sit more and move less during the remainder of the day. This self-defeating behavior can lead to frustration that exercise is not providing the weight management benefits it should. It is important to keep daily NEAT levels up regardless of exercise levels.

A growing number of studies are showing that the body is much better able to maintain its energy balance—and, therefore, keep body weight at a healthy level—when the overall daily activity level is high. An active person can vary calories from day to day with fewer swings in body weight, whereas a sedentary person who changes caloric intake will see those changes amplified, observed by greater swings in body weight.

A person with a desk job who has the option to stand and move about throughout the day will expend 300 more calories a day 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, easily expend 700 additional daily calories than a person with a sedentary desk job. People with physically demanding jobs, such as construction workers, can easily burn between 1,000 and 2,000 extra daily calories than a sedentary worker.

Beyond the workday are several hours of leisure time that can also be spent quite differently on a vast variety of physical activities, from activities that are light physical activity to sports and exercise that is **vigorous physical activity**. Variations in NEAT add up over days, months, and years and provide substantial benefits with weight management and health.

GLOSSARY

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, which requires expenditure of energy and produces progressive health benefits. Examples include walking, taking the stairs, dancing, gardening, working in the yard, cleaning the house, shoveling snow, washing the car, and all forms of structured exercise.

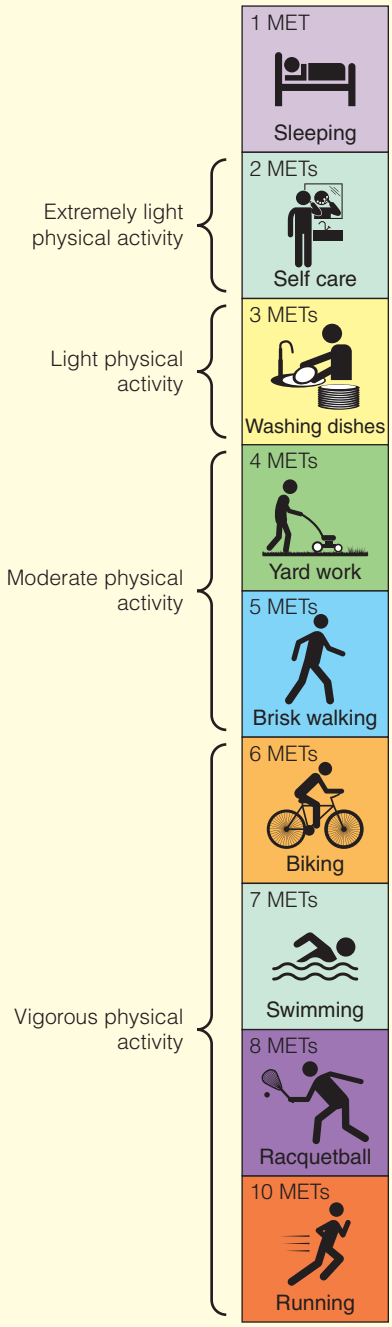
Light physical activity Any activity that uses fewer than 150 calories of energy per day, such as casual walking and light household chores.

Nonexercise activity thermogenesis (NEAT) Energy expended doing everyday activities not related to exercise.

Vigorous physical 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 10–12 mph, playing doubles in tennis, and vigorous strength training.)

Light, Moderate, and Vigorous Physical Activity

Adults should do 150 minutes a week of moderate-intensity physical activity, 75 minutes a week of vigorous-intensity physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity. Adults should also strive to incorporate light physical activity into daily life as often as possible. Intensity of physical activity can be measured in METs. "*MET*" stands for *metabolic equivalent*. The baseline measurement is a single MET. One MET is the amount of oxygen utilized by a person when resting. An activity that has the intensity of two METs utilizes double that amount of oxygen. An activity that has the intensity of three METs utilizes triple, and so on.



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.

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. 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, and gardening.

Light physical activity (along with moderate physical activities lasting less than 10 minutes in duration) is not included as part of the moderate physical activity recommendation, though it is included as part of one's NEAT for a given day.

1.8 Types of Physical Fitness

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

Health-related fitness relates to the ability to perform activities of daily living without undue fatigue. The health-related fitness components are cardiorespiratory (aerobic) endurance, muscular fitness (muscular strength and endurance), muscular flexibility, and body composition (Figure 1.9).

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.

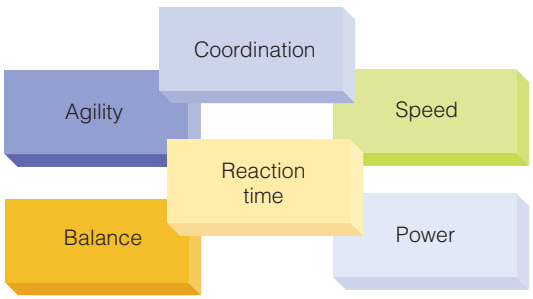
Performance-related fitness components consist of agility, balance, coordination, reaction time, speed, and power (Figure 1.10). These components are related primarily to successful sports and motor skill performance. Participating in performance-related activities contributes to physical fitness, but in terms of general health promotion and wellness, the main emphasis of physical fitness programs should be on the health-related components.

1.9 Fitness Standards: Health Versus Physical Fitness

Our bodies adapt to the different types of physical activity we participate in, and the result is different levels of personal fitness. A meaningful debate regarding fitness standards has resulted in two widely recognized categories of fitness: health fitness standards (also referred to as *criterion referenced*) and physical fitness standards. Following are definitions of both. The assessment of health-related fitness is presented in Chapter 4, Chapter 6, Chapter 7, Chapter 8, and Chapter 9, where appropriate physical fitness standards are included for comparison.

Figure 1.9 Health-related components of physical fitness.

Figure 1.10 Performance-related components of physical fitness.



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 is conducive to a low risk of premature hypokinetic diseases and requires only moderate physical activity. For example, a 2-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 1.11 and as discussed earlier, significant health benefits can be reaped with such a program. These benefits include a reduction in blood lipids, lower blood pressure, weight loss, stress release, less risk for diabetes, and lower risk for disease and premature mortality. 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.

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.

One way to determine a person's fitness level is by assessing his or her **cardiorespiratory endurance**, which can be expressed in terms of VO_{2max}. Essentially, as a person moves or exercises more, the body adapts so that it is able to take in more oxygen and better utilize the oxygen it takes in. Specific changes occur in the heart, lungs, and muscles to make this possible (see Chapter 6). The maximum (max) amount of oxygen

GLOSSARY

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

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 prescribed to improve the individual's overall health.

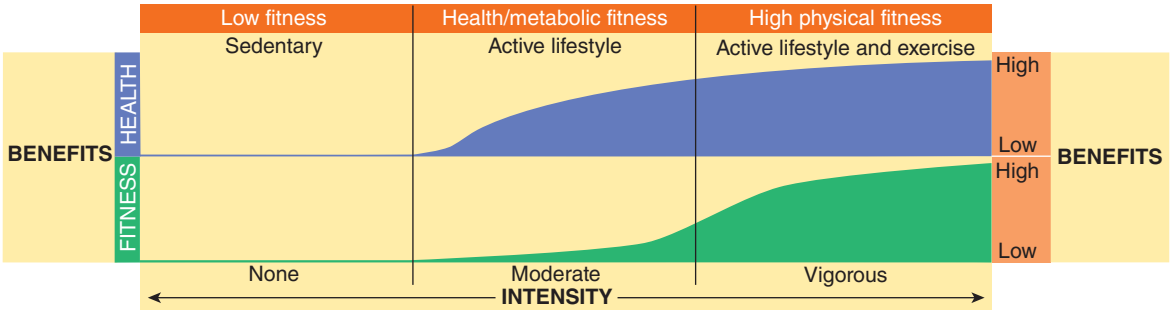
Performance-related fitness Fitness components important for success in skillful activities and athletic events; encompasses agility, balance, coordination, reaction time, speed, and power.

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 1.11 Health and fitness benefits based on the type of lifestyle and physical activity program.



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(O_2) that a person is able to use is measured in volume (V) per minute of exercise. A person's 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 of VO_{2max} 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.

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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 (men) and 32.5 mL/kg/min (women) to reach health fitness standards and benefit from metabolic fitness.

Research data from the study presented in Figure 1.7 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 least fit and moderately fit individuals. Therefore, the 35 and 32.5 mL/kg/min values are 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 U.S. 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.

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 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 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 guidelines complement the current *Dietary Guidelines for Americans* (Chapter 3) and parallel the international recommendations issued by the WHO and recommendations issued by the ACSM and the AHA.

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 (see Table 1.3).

Adults Between 18 and 64 Years of Age

- All adults should move more frequently and sit less throughout the day. Any amount of physical activity provides some health benefits.

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

Financial Fitness Prescription

Tatiana Popova/Shutterstock.com

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 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 6 percent interest rate, at age 65 you will have more than $275,000. Think what this amount could be if you are able to put away $200 to $500 a month.
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 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

Behavior Modification Planning (continued)

(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

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

Table 1.3 Physical Activity Guidelines

Benefits	Duration per Day	Intensity	Frequency per Week	Weekly Time
Health	At least 30 min	MI*	5 times	150–300 min
Health and fitness	At least 25 min	VI*	3 times	75–150 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.

- Adults should do 150 minutes (2½ hours) to 300 minutes (5 hours) a week of moderate-intensity aerobic (cardiorespiratory) physical activity, 75 minutes (1 hour and 15 minutes) to 150 minutes (2½ hours) 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 and vigorous-intensity activity on another 2 days. Preferably, aerobic activity should be performed throughout the week.
- Additional health benefits are provided by increasing beyond the equivalent 300 minutes (5 hours) of moderate-intensity aerobic physical activity per week.
- Adults should also do muscle-strengthening activities that involve all major muscle groups on 2 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 3 days per week.
- Children and adolescents should also do muscle-strengthening and bone-strengthening activities on at least 3 days per week.

Pregnant and Postpartum Women

- Healthy women who are not already doing vigorous-intensity physical activity should get at least 150 minutes (2½ hours) of moderate-intensity aerobic activity a week during pregnancy and the postpartum period. Preferably, this activity should be spread throughout the week. Women who regularly engage in vigorous-intensity aerobic activity prior to pregnancy can continue their activity throughout pregnancy and the postpartum period, provided that their condition remains unchanged and they talk to their health care provider about their activity level throughout this time.

Because of the ever growing epidemic of obesity in the U.S. 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. Individuals are also advised that additional physical activity beyond minimum thresholds is necessary for some and can provide additional health benefits for all.

The *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, whereas others will find they need more than 300 minutes per week. This recommendation was based on evidence indicating that people who maintain healthy weight typically accumulate 1 hour of daily physical activity.

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.

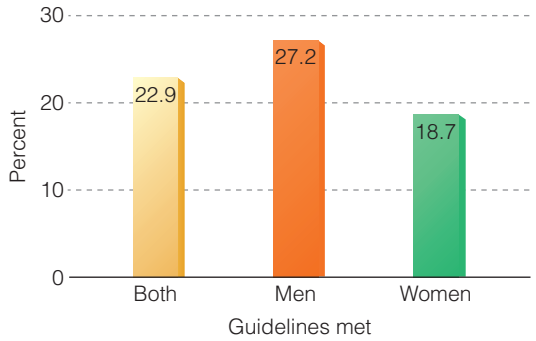
Critical Thinking

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?

1.11 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 2018 by the Centers for Disease Control and Prevention (CDC) indicate that only 22.9 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 44.7 percent of the adult population do not meet the guidelines (Figure 1.12).

Figure 1.12 Percentage of adults who met the federal guidelines for aerobic and muscle-strengthening activities.



SOURCE: CDC, "State Variation in Meeting the 2008 Federal Guidelines for Both Aerobic and Muscle-Strengthening Activities Through Leisure-Time Physical Activity Among Adults 18–64: United States, 2010–1015," June 28, 2018.

Activity Trackers

It is important to have an accurate idea of the level of activity you get in a day to establish a groundwork from which you build your fitness goals. You may face an initial shock, as some of us have, when you see how little daily NEAT you accumulate, but remember that accurate data are the foundation for results. Studies have found 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 indicates changes in movement (acceleration and deceleration). Activity trackers add an array of features to that functionality. 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. As you can imagine, a

GLOSSARY

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

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Activity trackers can be used to monitor daily physical activity.

wrist-worn activity tracker will not do well measuring a grueling bike workout. Accelerometers 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. Users simply need to keep limitations in mind.

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. Consider what you should prioritize for your own lifestyle: accurate GPS tracking, long battery life, vibration alarms that prompt movement, the ability to download programs and connect to online support networks, or other features. Some companies offer different models depending on whether a user is interested in tracking daily activity or vigorous exercise. Be sure to follow instructions to calibrate the device to your personal stride. Another option is to use the accelerometer in your smartphone 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.

Recommended Steps per Day

The typical American man takes about 6,000 steps per day; the typical women takes about 5,300 steps. The general recommendation for adults is 10,000 steps per day, and Table 1.4 provides specific activity categories based on the number of daily steps taken. 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.[30]

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.

If you do not accumulate the recommended 10,000 daily steps, you can refer to Table 1.5 to determine the additional walking or jogging distance required to reach your goal.

Table 1.4 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.

Table 1.5 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 × pace) − (14.1 × height)]

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

Jogging

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

SOURCE: 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.

Example. If you are 5 feet 8 inches 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-step 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 1.5, you can estimate the number of steps at that speed using the prediction equations at the bottom of this table.

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 1- to 7-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.

1.12 Economic Benefits of Physical Activity

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 U.S. rose from $12 billion in 1950 to $3.6 trillion in 2018 (Figure 1.13), or about 17 percent of the country's gross domestic product (GDP). In 1980, health care costs in the U.S. represented 8.8 percent of the U.S. GDP.[31] This ratio far outpaces the spending of all other countries in the OECD. According to the Institute of Medicine, about 25 percent of health care costs are wasteful or inefficient.[32]

Figure 1.13 U.S. health care cost increments since 1950.

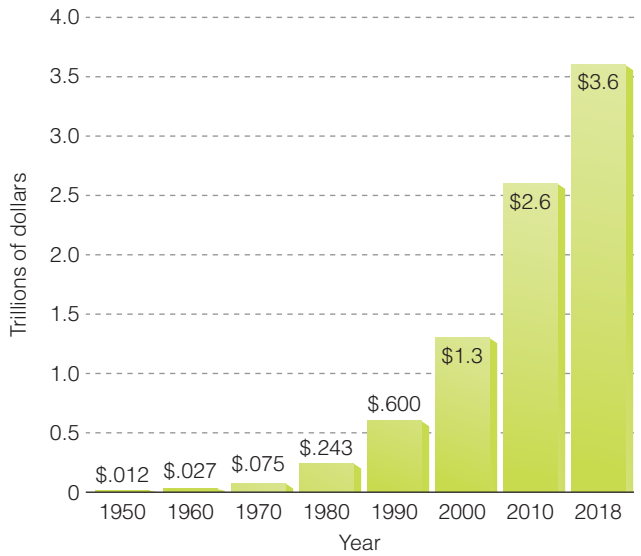
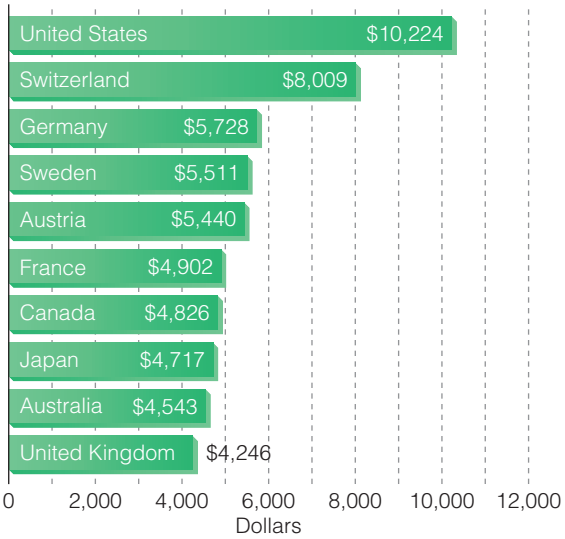


Figure 1.14 Health care expenditure per capita for selected countries, 2017.



SOURCE: Kaiser Family Foundation (KFF) analysis of OECD National Health Expenditure data, January 28, 2020. Available at https://www.oecd-ilibrary.org/social-issues-migration-health/data/oecd-health-statistics_health-data-en.

In terms of yearly health care costs per person, the U.S. ranks in the top three of OECD countries. Per capita U.S. health care costs exceed $10,000 per year. These costs more than double the OECD average (Figure 1.14). 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, and groceries).

An estimated 5 percent of the people account for 50 percent of health care costs.[33] This group spends an annual average of around $50,000 in health care. The top 1 percent average about $110,000. On the other end, the 50 percent of the people who spend the least account for only 3 percent of all total health spending, about $276 per year. 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.

1.13 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 exercise regularly 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, chronic stress, drinking too much alcohol, and eating too many foods high in saturated fat.

Activity 1.1 Daily Physical Activity Log*

Name _____ **Date** _____

Course _____ **Section** _____ **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 1.4): |

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 1.4): |

*Make additional copies of this form as needed.

These factors place people at risk for cardiovascular disease and other chronic diseases of which they may not be aware.

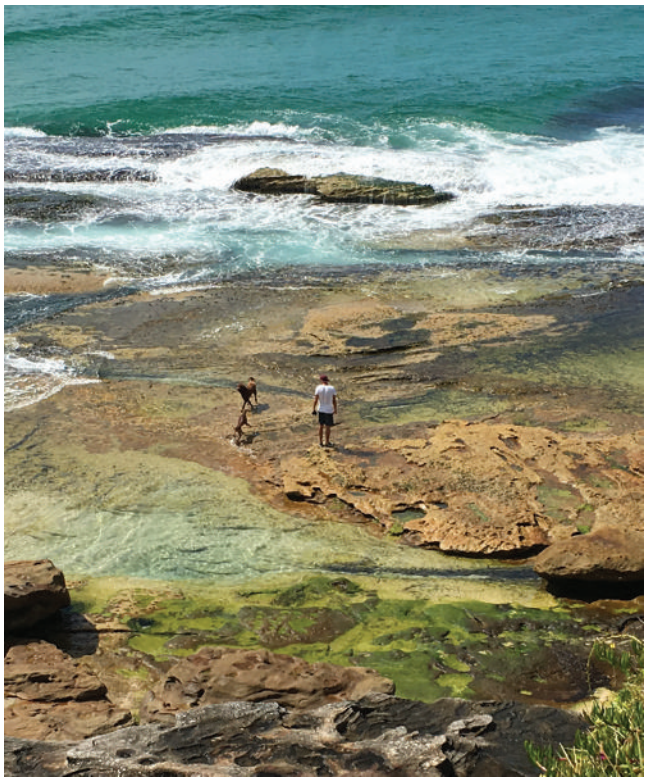
Even though most people are aware of their unhealthy behaviors, they seem satisfied with life as long as they are free from symptoms of disease or illness. Nevertheless, present lifestyle habits dictate the health and well-being of tomorrow. In particular for some diseases like cardiovascular disease, cancer, diabetes, and Alzheimer's. Activity in early and mid-adulthood affects disease risk for the remainder of the lifespan.

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. Living a wellness way of life is a personal choice, but you may need additional support to achieve wellness goals.

The Seven Dimensions of Wellness

Wellness has seven dimensions: physical, emotional, mental, social, environmental, occupational, and spiritual (Figure 1.15). 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 go to work, and may be more susceptible to illness and disease.

Figure 1.15 Dimensions of wellness.



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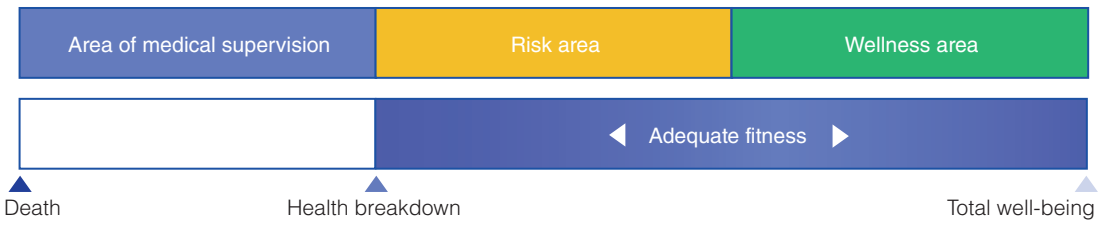
Time spent in natural settings has been clinically shown to improve wellness.

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.

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 1.16.

Figure 1.16 Wellness continuum.



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.

GLOSSARY

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. Interviews with people who live past 100 years of age indicate that they prioritize staying active on a daily basis. Their daily routing includes gardening, yardwork, swimming, and lots of walking.

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. You enjoy the safety and routine of familiar environments while, also, confidently approaching new and less predictable experiences. Your confidence and enthusiasm enable you to approach any learning situation with eagerness that leads to success. Staying mentally engaged through a lifetime reading program has also been shown to extend life.

Mental wellness brings with it vision and promise. It brings with it the ability to expand the places and situations in your life where you are confident. 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.

Research has consistently shown that people who have healthy loving relationships and a strong social network live healthier and longer lives. 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.

Research points to the importance of social wellness. Loneliness increases levels of the stress hormone cortisol, increases vascular resistance, impairs immune function, and accelerates cognitive decline. Young people also need to guard against chronic loneliness. Individuals who were constantly isolated as youths have been shown to have poorer health later in life.[34] Human connection is critical, and taking advantage of organizations, classes, and group activities in the community will bring long-term payoffs.

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.

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; recycling; conserving paper and water; 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; 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.

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, whereas satisfaction can be improved with motivating factors such as recognition for accomplishments or work the employee finds purposeful and satisfying. A situation in which employees enjoy both positive hygiene factors and positive motivating factors 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 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.[35] 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.[36]

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.[37]

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.

GLOSSARY

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

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 one another in an environment.

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

Spiritual wellness The sense that life is meaningful and 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.

fstop123/E+/Getty Images

Altruism enhances health and well-being.

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 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.

1.14 Meeting the 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 U.S. 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?

1.15 Wellness Education

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.

In this course 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.
- Recognize the health consequences of sexually transmitted infections (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, those with 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.

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

Before you engage in an exercise program or participate in any exercise testing, at a minimum you should review the Health History Questionnaire found 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. 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 fitness and wellness, 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.

1.16 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). 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.

Heart Rate

To determine your heart rate, 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

Get it Done: 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 5 to 10 minutes.
2. *Do not smoke cigarettes.* Cigarette smoking is the largest preventable cause of illness and premature death in the U.S. 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?

Table 1.6 Resting Heart Rate Ratings

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

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

Blood pressure is assessed using a **sphygmomanometer** and a stethoscope. In 2019, the AHA released updated guidelines for the proper measurement of blood pressure.[38] Ideally, the person should sit quietly for 3 to 5 minutes prior to taking the measurement and should not talk during this time. Exercise, smoking, and caffeine are to be avoided 30 minutes prior to testing. During the assessment, the individual sits calmly in a chair with the back supported, uncrossed legs, feet flat on the floor, the arm slightly flexed, and the forearm resting on a flat surface at the same level as the heart. Sleeves should not be rolled up because this creates a tourniquet effect that will yield a higher reading.

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Assessment of resting blood pressure with an aneroid manometer.

At first, the pressure is recorded from each arm and after that from the arm with the higher reading.

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. The cuff should be applied on bare skin, 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.

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 1 minute, then the bladder is inflated to the predetermined level to take the blood pressure reading. The cuff should not be overinflated because 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.

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

Rating	Systolic		Diastolic
Normal	<120	and	<80
Elevated	120–129	and	<80
Stage 1 Hypertension	130–139	or	80-89
Stage 2 Hypertension	>140	or	>90
Hypertensive crisis	>180	and/or	>120

SOURCE: American College of Cardiology/American Heart Association.

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.

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).

The 2019 guidelines also encourage unattended automated office blood pressure (AOBP) assessment. This procedure requires the individual to sit quietly and alone in a room while hooked up to an automated electronic monitor that measures blood pressure a minimum of three times and produces an average of the three recordings. The absence of medical personnel in the room prevents talking and minimizes the "white-coat hypertension" effect caused by the presence of medical staff in the room.

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 and DBP assessments in Activity 1.4. You can also calculate the effects of aerobic activity on resting heart rate in this activity.

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.

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 affect your health?
2. Do you accumulate at least 30 minutes of moderate-intensity physical activity 5 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

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. The category of movement called nonexercise activity thermogenesis (NEAT) includes
   a. extremely light expenditures of energy like performing self-care.
   b. light physical activity like walking to work.
   c. moderate physical activity like raking leaves.
   d. energy expenditure that does not come from basic ongoing body functions.
   e. all of these.
3. The leading cause of death in the U.S. 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 of these.
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 interval-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** _____ **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, 2 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 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), 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 excessive tension and stress (distress) and act on it when I do.	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 whole-some recreational activities.	5	4	3	2	1
17. I sleep 7 to 8 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 (*Continued*)

	ALWAYS	NEARLY ALWAYS	OFTEN	SELDOM	NEVER
19. I get "safe sun" exposure (that is, 10 to 20 minutes unprotected sun exposure to the face, neck, and arms, on most days of the week between the 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 require 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

Activity 1.2 (*Continued*)

How to Score

Enter the score you have marked for each question in the spaces provided here. Next, total the score for each specific wellness lifestyle category, and obtain a rating for each category according to the criteria provided.

	Health-Related Fitness	Nutrition	Avoiding Chemical Dependency	Stress Management	Personal Hygiene/ Health	Disease Prevention	Emotional Well-being	Personal Safety	Environmental Health & Protection
1.		5.	9.	13.	17.	21.	25.	29.	33.
2.		6.	10.	14.	18.	22.	26.	30.	34.
3.		7.	11.	15.	19.	23.	27.	31.	35.
4.		8.	12.	16.	20.	24.	28.	32.	36.
Total:									
Rating:									

Category Rating

Excellent (E) = ≥17 Your answers show that you are aware of the importance of this category to your health and wellness. You are putting your knowledge to work for you by practicing good habits. As long as you continue to do so, this category should not pose a health risk. You are also setting a good example for family and friends to follow. Because you got a very high score on this part of the test, you may want to consider other categories in which your score indicates room for improvement.

Good (G) = 13–16 Your health practices in this area are good, but you have room for improvement. Look again at the items you answered with a 4 or lower and identify changes that you can make to improve your lifestyle. Even small changes often can help you achieve better health.

Needs Improvement (NI) = ≤12 Your health risks are showing. You may be taking serious and unnecessary risks with your health. Perhaps you are not aware of the risks or what to do about them. Most likely you need additional information and help in deciding how to successfully make the changes you desire. You can easily get the in-formation that you need to improve, if you wish. The next step is up to you.

Please note that no final overall rating is provided for the entire questionnaire, because it may not be indicative of your overall wellness. For example, an excellent rating in most categories will not offset the immediate health risks and life-threatening consequences of using addictive drugs or not wearing a seat belt.

Activity 1.3 Health History Questionnaire

INTRODUCTION

Although exercise testing and exercise participation are relatively safe for most apparently healthy individuals, the reaction of the cardiovascular system to increased levels of physical activity cannot always be totally predicted. Consequently, there is a small but real risk of certain changes occurring during exercise testing and participation. Some of these changes may be abnormal blood pressure, irregular heart rhythm, fainting, and in rare instances a heart attack or cardiac arrest. Therefore, you must provide honest answers to this questionnaire. Exercise may be contraindicated under some of the conditions listed below; others may simply require special consideration. **If any of the conditions apply, consult your physician before you participate in an exercise program.** Also, promptly report to your instructor any exercise-related abnormalities that you may experience during the course of the semester.

A. Have you ever had or do you now have any of the following conditions?

- ☐ 1. A myocardial infarction
- ☐ 2. Coronary artery disease
- ☐ 3. Congestive heart failure
- ☐ 4. Elevated blood lipids (cholesterol and triglycerides)
- ☐ 5. Chest pain at rest or during exertion
- ☐ 6. Pain in the chest that may radiate to the jaw, shoulders, arms, or between the shoulder blades
- ☐ 7. Shortness of breath or difficulty breathing
- ☐ 8. An abnormal resting or stress electrocardiogram
- ☐ 9. Uneven, irregular, or skipped heartbeats (including a racing or fluttering heart)
- ☐ 10. A blood embolism
- ☐ 11. Thrombophlebitis
- ☐ 12. Rheumatic heart fever
- ☐ 13. Elevated blood pressure
- ☐ 14. A stroke
- ☐ 15. Diabetes
- ☐ 16. A family history of coronary heart disease, syncope, or sudden death before age 60
- ☐ 17. Fever
- ☐ 18. Chills
- ☐ 19. Sore throat
- ☐ 20. New state of confusion
- ☐ 21. New loss of taste or smell
- ☐ 22. Muscle pain not related to overexertion
- ☐ 23. Blue lips or face
- ☐ 24. Inability to wake or stay awake
- ☐ 25. Any other heart problem that makes exercise unsafe

B. Do you have any of the following conditions?

- ☐ 1. Arthritis, rheumatism, or gout
- ☐ 2. Chronic low back pain
- ☐ 3. Any other joint, bone, or muscle problems
- ☐ 4. Any respiratory problems
- ☐ 5. Obesity (more than 30 percent overweight)
- ☐ 6. Anorexia
- ☐ 7. Bulimia
- ☐ 8. Mononucleosis
- ☐ 9. Any physical disability that could interfere with safe participation in exercise

C. Do any of the following conditions apply?

- ☐ 1. Do you smoke cigarettes or use any other tobacco- or nicotine-containing products?
- ☐ 2. Are you taking any prescription drugs?

D. Do you have any other concern regarding your ability to safely participate in an exercise program? If so, explain:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Activity 1.4 Resting Heart Rate and Blood Pressure

Name _____ **Date** _____

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

Resting Heart Rate and Blood Pressure

Determine your resting heart rate and blood pressure in the right and left arms while sitting comfortably in a chair.

Resting Heart Rate: [ ] Rating: [ ] (see Table 1.6)

Blood Pressure:	Right Arm	Rating (from Table 1.7)	Left Arm	Rating (from Table 1.7)
Systolic				
Diastolic				

Computing the Effects of Aerobic Activity on Resting Heart Rate

Using your actual resting heart rate (RHR) from Part I of this lab, compute the total number of times your heart beats each day and each year:

A. Beats per day = _____ (RHR bpm) × 60 (min per hour) × 24 (hours per day) = _____ beats per day

B. Beats per year = _____ (heart rate in beats per day, use item A) × 365 = _____ beats per year

If your RHR dropped 20 bpm through an aerobic exercise program, determine the number of beats that your heart would save each year at that lower RHR:

C. Beats per day = _____ (your current RHR – 20) × 60 × 24 = _____ beats per day

D. Beats per year = (heart rate in beats per day, use item C) × 365 = _____ beats per year

E. Number of beats saved per year (B – D) _____ – _____ = _____ beats saved per year

Assuming that you will reach the average U.S. life expectancy of 81 years for women or 76 for men, determine the additional number of "heart rate life years" available to you if your RHR were 20 bpm lower:

F. Years of life ahead = _____ (use 81 for women and 76 for men) – _____ (current age) = _____ years

G. Number of beats saved = _____ (use item E) × _____ (use item F) = _____ beats saved

H. Number of heart rate life years based on the lower RHR = _____ (use item G) + _____ (use item D) = _____ years