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Fitness & Wellness

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Preface

Most people go to college to learn how to make a living. Making a good living, however, won't help them unless they live a wellness lifestyle that will allow them to enjoy what they have. The current American lifestyle, however, does not provide the human body with sufficient physical activity to enhance or maintain adequate health. As a result, a sound fitness and wellness program is of utmost importance to lead a long and healthy life, reach one's potential, and maintain quality of life without physical limitations.

Science has clearly determined that a lack of physical activity is detrimental to health. In fact, the office of the U.S. Surgeon General has identified physical fitness as a top health priority by stating that the nation's top health goals include exercise, increased consumption of fruits and vegetables, smoking cessation, and the practice of safe sex. All four of these fundamental healthy lifestyle factors are addressed in this book.

Many of the behaviors we adopt in life are a product of our environment. Currently, we live in a "toxic" health/fitness environment. We are so habituated to our modern-day environment that we miss the subtle ways it influences our behaviors, personal lifestyles, and health each day. The epidemic of physical inactivity and obesity that is sweeping across the United States is so harmful to health that it actually increases the deterioration rate of the human body and leads to premature aging, illness, and death.

Based on the updated *Physical Activity Guidelines for Americans* released in 2018 (2nd edition), 80 percent of U.S. adults are not meeting the key guidelines for both aerobic and muscular-strengthening activity. Only about one-half meet the recommended amount of weekly aerobic physical activity, whereas less than a fourth meet the guidelines for muscular-strengthening activity. Among those who meet the guidelines, many do not reap the full benefits because they simply do not know how to implement and stick with a program that will yield the desired results.

The good news is that lifetime wellness is within the grasp of most people. We know that most chronic and debilitating conditions are largely preventable. Scientific evidence has shown that improving the quality and length of our lives is a matter of personal choice.

A regular exercise program is as close as we get to the miracle pill that people look for to enjoy good health and quality of life over a now longer lifespan. The myriad benefits of exercise include enhanced functional capacity; increased energy; weight loss; improved mood, self-esteem, and physical appearance; decreased risk for many chronic ailments, including obesity, cardiovascular disease, cancer, and diabetes; and a much lower risk for premature mortality. 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*."

This course offers you the necessary information to start on your path to fitness and wellness by adhering to a healthy lifestyle. The information in the following chapters and the subsequent activities at the end of each chapter will enable you to develop a personal program that promotes lifetime fitness, preventive health care, and personal wellness. The emphasis throughout the course is teaching you how to take control of your lifestyle habits so that you can do what is necessary to stay healthy and realize your optimal well-being.

What the Course Covers

As you study this material and complete the respective activities, you will learn to do the following:

- Understand the importance of good physical fitness and a wellness lifestyle in the achievement of good health and quality of life and a more productive and longer life.
- Determine whether medical clearance is needed for your safe participation in exercise.
- Implement behavior modification techniques to help you adhere to a lifetime fitness and wellness program.
- Assess the health-related components of fitness (cardiorespiratory endurance, muscular fitness [strength and endurance], muscular flexibility, and body composition).
- Create exercise prescriptions for cardiorespiratory endurance, muscular fitness, and muscular flexibility.
- Analyze your diet and learn the principles that govern sound nutrition.
- Develop sound diet and weight-management programs.
- Understand stress, lessen your vulnerability to stress, and implement a stress management program if necessary.
- Implement a cardiovascular disease risk-reduction program.
- Follow guidelines to reduce your personal risk of developing cancer.
- Implement a smoking cessation program, if applicable.

- Understand the health consequences of chemical dependency and irresponsible sexual behaviors and learn guidelines for preventing sexually transmitted infections.
- Discern between myths and facts of exercise and health-related concepts.

New in the 14th Edition

This 14th edition of *Fitness & Wellness* provides a modern and visually stimulating layout throughout the text, and the authors have developed and sourced many new informational boxes and photos in each chapter. Throughout the text, the authors have made substantial changes with the focus of finding new ways to help students understand and achieve a wellness way of life. Many chapters have been rethought and reorganized with new headings and enhanced introductory text.

Fitness & Wellness now has 10 chapters, as the behavior modification information from Chapter 1 has been placed into a chapter all its own (Chapter 2). All 10 chapters have been revised and updated according to advances published in the scientific literature and information reported at professional health, fitness, wellness, and sports medicine conferences. Note that the numbered reference notes for each chapter now appear in the end matter of the text, and Appendix E: Selective Nutrient Content of Common Foods is available online in MindTap for this edition. You can visit cengage.com/login to access MindTap. The following are the most significant chapter updates:

Chapter 1, Introduction to Physical Fitness and Wellness

- All figures and statistics have been updated to reflect the latest data, including the 2018 *Physical Activity Guidelines for Americans*. New Figure 1.2 helps students understand the greatest mortality risk at each age.
- The chapter has been shortened and refocused to help students better grasp the importance of physical activity and wellness. New Figure 1.7 presents the long-term and short-term benefits of exercise.

Chapter 2, Behavior Modification

- The behavior modification content from Chapter 1 has been separated and reorganized as Chapter 2.
- Up-to-the-minute research and realistic/personalized advice helps students set achievable and motivating goals.
- Added content helps students consider their unique individuality when setting goals.

Chapter 3, Assessment of Physical Fitness

- The content on "Fitness Conditioning: Responders versus Nonresponders" has been moved to this chapter.
- The explanation of oxygen uptake has been edited to make it an easier concept to understand.
- The American College of Sports Medicine (ACSM) guidelines as to who should seek medical clearance prior to undergoing exercise testing are given in the chapter.
- Information on body shape and health risks, including android and gynoid obesity, is new to the chapter.

Chapter 4, Exercise Prescription

- Updated data are provided on the number of Americans who currently meet the federal physical activity guidelines.
- Information on activity trackers and the recommended number of steps to accumulate each day is now found in this chapter.
- All exercise prescription recommendations conform to the ACSM Guidelines for Exercise Testing and Prescription.

Chapter 5, Personal Fitness Programming

- Chapter 5, now titled "Personal Fitness Programming," has been updated to help students choose realistic exercise options that will greatly enhance their success rate based on their current personal lifestyle.
- A new Activity 5.1 guides students through a reflection process about the aspects of an exercise regimen that they will personally enjoy.
- New fitness activities, including rucking and distance training, are discussed.
- A new feature offers guidelines for success when trying a new sport.

Chapter 6, Nutrition for Wellness

- Key nutrient contents have been revised throughout the chapter to conform with current nutrient data available to the consumer.
- Overall chapter contents have been edited to simplify statistical nutrient data presented in the chapter.

- The new food label approved by the Food and Drug Administration (FDA), required for all packaged food by 2021, is presented in the chapter.
- An update is provided on the FDA ban on the use of trans fats in foods sold in American restaurants and at all grocery stores.

Chapter 7, Weight Management

- The most recent data on the incidence of overweight and obesity in the United States published by the Centers for Disease Control and Prevention (CDC) are presented.
- The content on fad dieting has been revised.
- Some of the most popular diets on the market today are described.
- The factors that determine the daily energy (caloric) requirement are discussed.
- The discussion on the benefits of additional light activity throughout the day has been expanded.
- Greater emphasis is placed on consuming most of one's daily calories during daytime hours and not during the evening meal.
- A new approach to estimate caloric expenditure of physical activity based on intensity of exercise during the activity is introduced.

Chapter 8, Stress Management

- The sympathetic nervous system and its role in activating the fight-or-flight response are introduced.
- The discussion of the importance of good sleep practices for college-age adults has been expanded.
- The organization of the stress management strategies section has been improved.

Chapter 9, A Healthy Lifestyle Approach

- A stronger emphasis is placed on light-intensity physical activity throughout the day to reduce the risk of premature cardiovascular mortality.
- The discussion of the importance of proper nutrition on blood lipids management has been expanded.
- New information about cancer prevention guidelines will help students make positive/immediate lifestyle changes. Additions include a feature about safe sun exposure and a figure explaining the relative risk of cancer-causing agents according to the International Agency for Research on Cancer (IARC).

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- Current information on the prevalence of nonmedical use of prescription drugs has been added based on the newest data available from the CDC.

Chapter 10, Fitness and Wellness FAQ

- Several of the questions in this chapter have been edited and updated to conform with advances in the fitness and wellness field.

Additional Course Resources

- **Health MindTap for Fitness & Wellness.** MindTap is an outcomes-driven application that propels students from memorization to mastery. MindTap is the platform that gives you complete control of your course—to craft unique learning experiences that challenge students,

build confidence, and elevate performance. Learn more at cengage.com/mindtap.

- **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 over 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 you complete the Wellness Profile Questionnaire, Diet & Wellness Plus will rate the level of concern for eight different areas of wellness, helping you determine the areas where you are most at risk. It then helps you put together a plan for positive change by helping you select a goal to work toward—complete with a reward for all your hard work.
- **Cengage Unlimited.** Cengage Unlimited saved students over $60 million in its first year. One subscription includes access to every Cengage online textbook and platform, along with study tools and resources that help students explore careers and gain the skills employers want. Learn more at cengage.com/unlimited/instructor.
- **Instructor Companion Site.** Everything you need for your course in one place! This collection of book-specific lecture and class tools is available online via cengage.com/login. Access and download PowerPoint presentations, the instructor's manual, an Educator Guide to help with course setup, and more.
- **Cengage Testing Powered by Cognero.** Cengage Testing Powered by Cognero is a flexible, online system that allows you to do the following:
  - Author, edit, and manage test bank content tailored for this course.
  - Create multiple test versions in an instant.
  - Deliver tests from your LMS, your classroom, or wherever you want.

Acknowledgments

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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 in the areas of exercise physiology, physical fitness, health, and wellness.

Dr. Hoeger completed his undergraduate and master's degrees in physical education and received his doctorate degree with an emphasis in exercise physiology. He is a *Fellow* of the *American College of Sports Medicine* and also of the


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Research Consortium of *SHAPE America (Society of Health and Physical Educators).* In 2002, he was recognized as the *Outstanding Alumnus* from the *College of Health and Human Performance* at *Brigham Young University.* He is the recipient of the first *Presidential Award for Research and Scholarship* in the *College of Education* at *Boise State University* in 2004.

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

Using his knowledge and personal experiences, Dr. Hoeger writes engaging, informative books that thoroughly address today's fitness and wellness issues in a format accessible to students. Since 1990, he has been the most widely read fitness and wellness college textbook author in the United States. He has published a total of 65 editions of his nine fitness and wellness-related titles. Among the textbooks written for Wadsworth/Cengage are *Principles and Labs for Fitness and Wellness,* 15th edition; *Lifetime Physical Fitness & 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.

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

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tests such as the Modified Sit-and-Reach, Total Body Rotation, Shoulder Rotation, Muscular Endurance, Muscular Strength and Endurance, and Soda Pop Coordination Tests.

Proving that he "practices what he preaches," he was the oldest male competitor in the 2002 Winter Olympics in Salt Lake City, Utah, at the age of 48. He raced in the sport of luge along with his then 17-year-old son Christopher. It was the first, and so far only time, in Winter Olympics history that father and son competed in the same event. In 2006, at the age of 52, he was the oldest competitor at the Winter Olympics in Turin, Italy. At different times and in different distances (800 m, 1,500 m, and the mile) in 2012, 2014, 2015, 2016, 2018, and 2019 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 Huntsman 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. She is extensively involved in the research process used in retrieving the most current scientific information that goes into the revision of each textbook. She is also the author of the software written specifically for the fitness and wellness textbooks. Her innovations in this area since the publication of the first edition

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of *Lifetime Physical Fitness & Wellness* set the standard for fitness and wellness computer software used in this market today.

Sharon is a co-author in five of the company's seven fitness and wellness titles. She also served as Chef de Mission (Chief of Delegation) for the Venezuelan Olympic Team at the 2006 Olympic Winter Games in Turin, Italy. Husband and wife have been jogging and strength training together for more than 41 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."

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Amber L. Fawson

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Cherie I. Hoeger

Amber L. Fawson and Cherie I. Hoeger received their degrees in English with an emphasis in editing for publication. For the past 19 years Amber has enjoyed working in the publication industry and has held positions as an Editorial Coordinator for *BYU Studies,* Assistant Editor for Cengage, and freelance writer and editor for tertiary education textbooks and workbooks. During the last 15 years, Cherie has been working as a freelance writer and editor; writing research and marketing copy for client magazines, newsletters, and websites; and contracting as a textbook copy editor for Cengage (previously under Thomson Learning and the Brooks/Cole brand).

Amber and Cherie have been working for Fitness & Wellness, Inc. for several years and have coauthored eight editions of the Hoeger *Fitness & Wellness* textbooks. They have taken on a significant role with the research, updates, writing, and illustrations in the new editions. There is now a four-person team to sort through and summarize the extensive literature available in the health, fitness, wellness, and sports medicine fields. Both Amber and Cherie are firm believers in living a healthy lifestyle, they regularly attend professional meetings in the field, and they are active members of the American College of Sports Medicine.

1

Daily physical activity is the miracle medication that people are looking for. It makes you look and feel younger, boosts energy, provides lifetime weight management, improves self-confidence and self-esteem, and enhances independent living, health, and quality of life. It further allows you to enjoy a longer life by decreasing the risk of many chronic conditions, including heart disease, high blood pressure, stroke, diabetes, some cancers, and osteoporosis.

Introduction to Physical Fitness and Wellness

OBJECTIVES

1.1 **Understand** the importance of lifetime fitness and wellness.

1.2 **Learn** the recommended guidelines for weekly physical activity.

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

1.4 **Understand** the benefits of a comprehensive fitness and wellness program.

1.5 **Determine** whether medical clearance is required for safe participation in exercise.

Real Life Story | Jordan's Experience

Last year as a freshman in college, I was advised to enroll in a general ed fitness and wellness course. I played high school sports and thought I knew all there was to know about being fit and in shape. As the course started, I realized I didn't really know how important it was to exercise regularly and take good care of myself. It quickly became my favorite class, and I couldn't wait to try what I was learning. I started cardio and strength workouts according to an exercise prescription I wrote myself. I didn't even know there was such a thing as an "exercise prescription." I even stretched once in a while and started to eat better. As I became more fit, I started to feel better about myself, I lost weight, I toned up, I had so much more energy, and I actually started to enjoy exercise. It is fun to work out! I now know that how well I will live the rest of my life has a lot to do with wellness choices I make. My goal is to never stop exercising and take good care of myself.

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Most people believe school will teach them how to make a better living. A fitness and wellness course will teach you how to live better—how to truly live your life to its fullest potential. Real success is about more than money: Making a good living will not help you unless you live a wellness lifestyle that will allow you to enjoy what you have.

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 were negative or harmful? Did you go for a walk or have a conversation with a friend? Did you buy and eat food that you felt good about? Did you pursue a task that held purpose and meaning for you? Conversely, did you battle ongoing stress and anxiety or allow yourself irregular sleep? Did you settle for highly processed food? Did you struggle with relationship problems? Did you regress to previous, unhealthy behaviors?

Take a moment to consider whether the choices from the past week repeated over years would accumulate to promote wellness or to cause disease. Even though most people in the United States believe a positive lifestyle has a great impact on health and longevity, most do not know how to implement a fitness and wellness program that will yield the desired results. Patty Neavill is an example of someone who frequently tried to change her life but was unable to do so because she did not know how to implement a sound exercise and weight control program. At age 24, Patty, a college sophomore, was discouraged with her weight, level of fitness, self-image, and quality of life in general.

She had struggled with weight management most of her life. Like thousands of other people, she had made many unsuccessful attempts to lose weight. Patty put aside her fears and decided to enroll in a fitness course. As part of the course requirement, she took a battery of fitness tests at the beginning of the semester. Patty's cardiorespiratory fitness and strength ratings were poor, her flexibility classification was average, she weighed more than 200 pounds, and she was 41 percent body fat.

Following the initial fitness assessment, Patty met with her course instructor, who prescribed an exercise and nutrition program such as the one presented in this book. Patty fully committed to carry out the prescription. She walked or jogged five times a week, worked out with weights twice a week, and played volleyball or basketball two to four times each week. Her daily caloric intake was set in the range of 1,500 to 1,700 calories. She took care to meet the minimum required amounts from the basic food groups each day, which contributed about 1,200 calories to

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Physical activity and exercise lead to less disease, a longer life, and enhanced quality of life.

her diet. The remainder of the calories came primarily from complex carbohydrates. By the end of the 16-week semester, Patty's cardiorespiratory fitness, strength, and flexibility ratings all had improved to the "good" category, she had lost 50 pounds, and her percent body fat had dropped to 22.5!

A thank-you note from Patty to the course instructor at the end of the semester read:

> *Thank you for making me a new person. I truly appreciate the time you spent with me. Without your kindness and motivation, I would have never made it. It's great to be fit and trim. I've never had this feeling before and I wish everyone could feel like this once in their life.*
>
> *Thank you, your trim Patty!*

Patty never had been taught the principles governing a sound weight loss program. She needed this knowledge, and, like most Americans who have never experienced the process of becoming physically fit, she needed to be in a structured exercise setting to truly feel the joy of fitness.

Of even greater significance, Patty maintained her aerobic and strength-training programs. A year after ending her calorie-restricted diet, her weight actually increased by 10 pounds—but her body fat decreased from 22.5 percent to 21.2 percent. As discussed in Chapter 7 the weight increase was related mostly to changes in lean tissue lost during the weight-reduction phase. Despite only a slight drop in weight during the second year following the calorie-restricted diet, Patty's 2-year follow-up revealed a further decrease in body fat, to 19.5 percent. Patty understands the new quality of life reaped through a sound fitness program.

Kate Ferguson

Kameron Kincade

In developed countries we have automated many of the daily physical activities that are still common in emerging countries.

1.1 Lifestyle, Health, and Quality of Life

Advances in technology have almost completely eliminated the necessity for physical exertion in daily life. Most nations, both emerging and developed, are experiencing an epidemic of physical inactivity.

Today in developed countries we live in an automated society. We no longer carry water back from a well, gather firewood, or hand-wash clothes. We grow up in communities that lack sidewalks, bike lanes, or amenities that are near enough to walk to. We go about life being driven walkable distances to save time, to avoid unpleasant weather, or to keep clothes and appearance pristine. We may not own weather-protective clothes because we go from home to car to school or work. Young people are part of this epidemic of inactivity. Sadly, 19-year-olds in the United States currently average the same level of physical activity as 60-year-olds.[1]

One of the most significant detrimental effects of modern-day technology has been an increase in **chronic diseases** related to a lack of physical activity. These include hypertension (high blood pressure), heart disease, diabetes, chronic low back pain, and obesity, among others. They sometimes are referred to as **hypokinetic diseases**. (*Hypo* means low or little, and *kinetic* implies motion.) In the United States, physical inactivity is the second greatest threat to public health (after tobacco use) and is often referenced in concerns about *sitting disease* and **sedentary death syndrome (SeDS)**. According to the World Health Organization (WHO), chronic diseases account for 60 percent of all deaths worldwide.[2]

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Public bikes make it easier for individuals to adopt a physically active lifestyle and also act as a cue that bikecommuting is an accepted and supported behavior in a community.

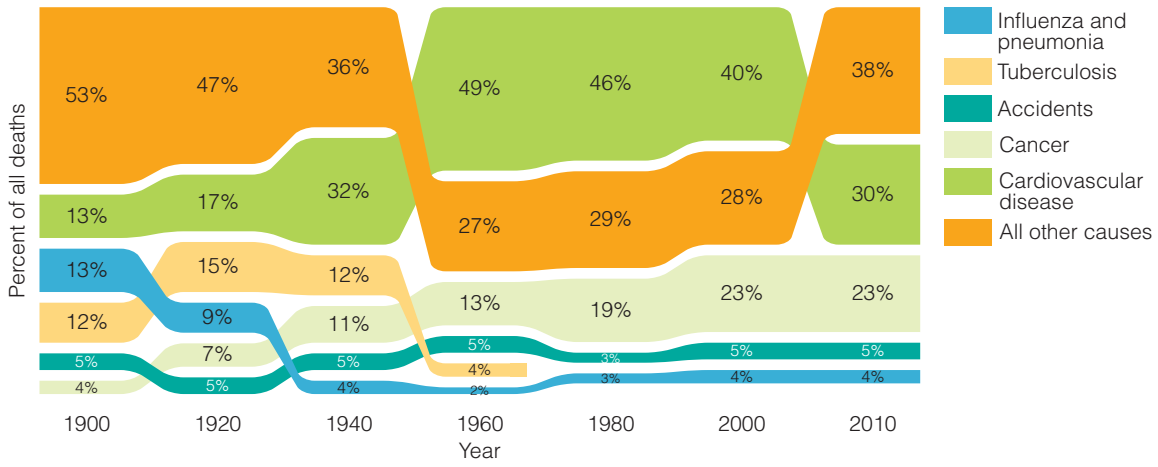
GLOSSARY

Chronic diseases Illnesses that develop and last over a long time period.

Hypokinetic diseases Diseases related to a lack of physical activity.

Sedentary death syndrome (SeDS) Deaths that are attributed to a lack of regular physical activity.

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

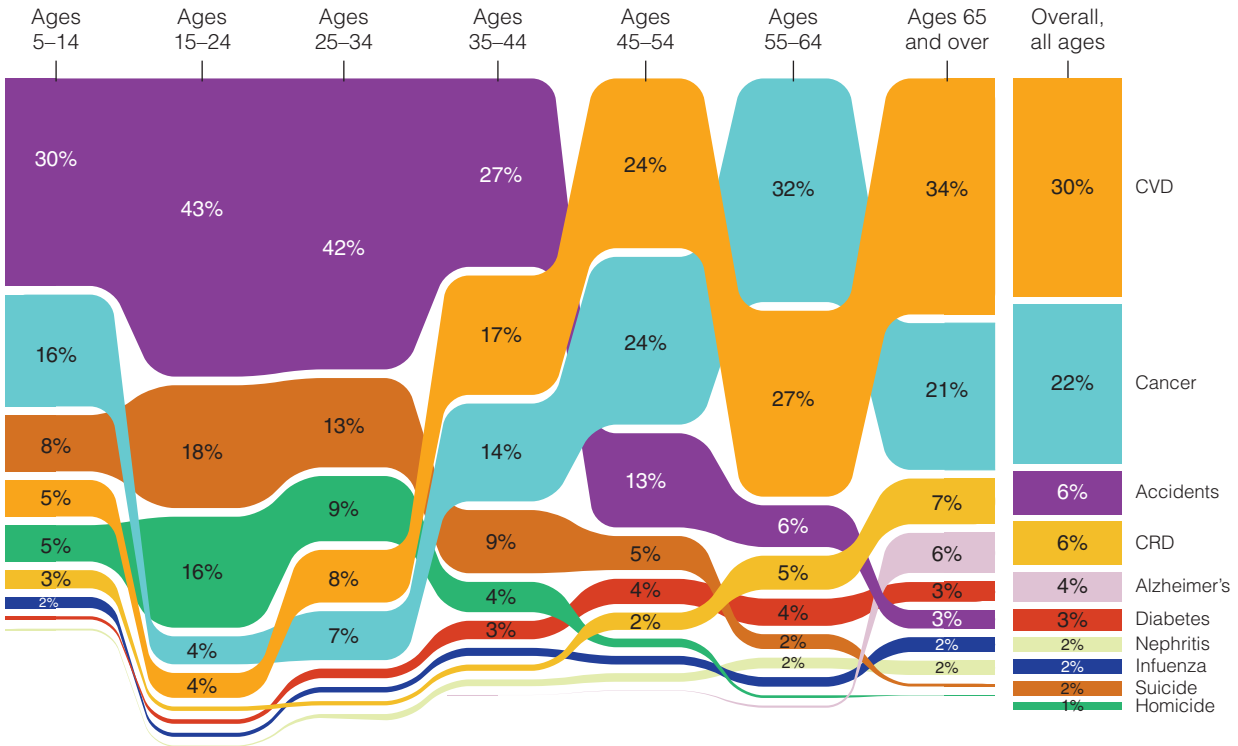


SOURCE: National Center for Health Statistics, Division of Vital Statistics.

Another downside of our chosen lifestyle is chronic stress. Suicide rates and drug abuse are climbing due to conventions we have normalized in our lifetimes. If we want to enjoy contemporary commodities yet still expect to live life to its fullest, we must take action. We must prioritize activities that relieve stress and promote wellness. And we must embrace a personalized lifetime exercise program as part of our daily lives.

The leading causes of death in the United States today are lifestyle-related (see Figure 1.1). More than half of all deaths in the United States are caused by cardiovascular disease and cancer.[3] Almost 80 percent of these deaths could be prevented by adhering to a healthy lifestyle. The third and fourth leading causes of death across all age groups are accidents and chronic lower respiratory disease, respectively. From the age of 1 to 44, accidents are the leading cause of death (see Figure 1.2). Specifically, automobile

Figure 1.2 Leading causes of death in the United States by age.



SOURCE: National Vital Statistics Reports, "Deaths: Final Data for 2016, Table 6. Number of deaths from selected causes, by age." Volume 67, Number 5, July 26, 2018.

accidents are the leading cause of death for teens, and drug overdose is the leading cause for people in their 20s and 30s. Suicide follows as the second leading cause of death for ages 10 to 34.[4]

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.

Even though not all accidents are preventable, many are. Consider automobile accidents. Across the United States, fewer than 15 percent of people taking trips in automobiles choose not to wear seatbelts, yet these people account for half of all automobile deaths. As for the cause of automobile accidents themselves, fatal accidents are often related to failure to stay in the correct lane or yield the right of way due to driver distraction or alcohol use.[5] Pedestrian deaths are another example of preventable accidents. Almost half of these deaths occur because either the driver or pedestrian is above the legal blood-alcohol level.[6]

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. Thus, the individual controls as much as 80 percent of his or her vulnerability to disease—and consequently quality of life. In essence, most people in the United States are threatened by the very lives they lead today.

1.2 Life Expectancy

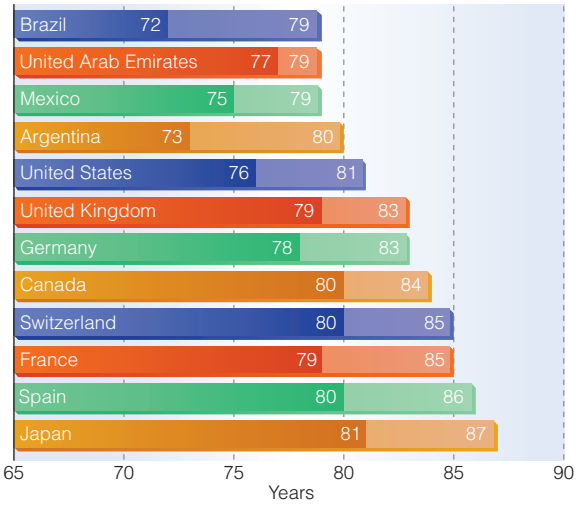
Currently, the average life expectancy in the United States is 78.6 years (76.1 years for men and 81.1 years for women).[7] After several years of ever-slowing improvement, in 2015 the life expectancy in the United States began an alarming decline. This decline has lasted longer than any other since the decline that occurred during the years 1915 to 1918, the years of World War I and the infamous flu epidemic. Today's decline is a result of a spike in deaths due to opioid addiction and suicide among people in their 20s and 30s, even as people aged 44 and up continue to fall victim to preventable chronic disease. Another alarming trend is evidence that people now spend an extra 1.2 years with a serious illness and an extra 2 years with a disability. A healthy lifestyle, on average, adds 5 to 6 years of disability-free life.[8]

The United States was once a world leader in life expectancy. Based on data from the World Health Organization (WHO), the United States now ranks 43rd in the world for life expectancy (see Figure 1.3), and a recent study suggests that the United States will plunge to a rank of 64th by the year 2040.[9]

The Need to Prevent Disease, Not Only Cure It

The United States has not invested the same resources in preventing disease as it has in treating disease after onset. Ninety-five percent of our health care dollars are spent on

Figure 1.3 Life expectancy at birth for selected countries: 2005–2015 projections.*



*Dark color is men; light color is women.

SOURCE: World Bank, "Life Expectancy at Birth (Male), 2016" and "Life Expectancy at Birth (Female), 2016," http://data.worldbank.org /indicator/SP.DYN.LE00.FE.IN.

treatment strategies, and less than 5 percent are spent on prevention. The latest data indicate that one in four adults in the United States has at least two chronic conditions.[10] This trend has health officials alarmed, as the burden on a patient with multiple conditions is greater than the sum of the individual diseases.

A report by the Organisation for Economic Co-operation and Development (OECD) found that while the United States far outspent every other country in health care costs per capita, it also easily had the highest rates of obesity of all 36 OECD countries.[11] As a nation, we are seeing the consequences of these numbers unfold. The incidence of diabetes climbed dramatically in parallel step with the incidence of obesity. Today, nearly half of the people in the United States have diabetes or prediabetes.[12]

In terms of yearly health care costs per person, the United States ranks in the top three among OECD countries. Per capita U.S. health care costs are about 2.5 times the OECD average. An estimated 5 percent of the people account for 50 percent of health care costs.[13]

1.3 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.[14] Regular physical activity also is important for the health of muscles, bones, and joints, and has been shown

in clinical studies to improve mood, cognitive function, creativity, and short-term memory and enhance one's ability to perform daily tasks throughout life. It also can have a major impact on health care costs and helps maintain a high quality of life into old age.

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).**[15] 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, on an average day, may expend 1300 calories simply maintaining vital body functions (the basal metabolic rate) and 200 calories digesting food (thermic effect of food). Any additional energy expended during the day is expended either through exercise or NEAT. For an active person, NEAT accounts for a major portion of energy expended each day. Though it may not increase cardiorespiratory fitness as moderate or vigorous exercise will, NEAT can easily use more calories in a day than 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.

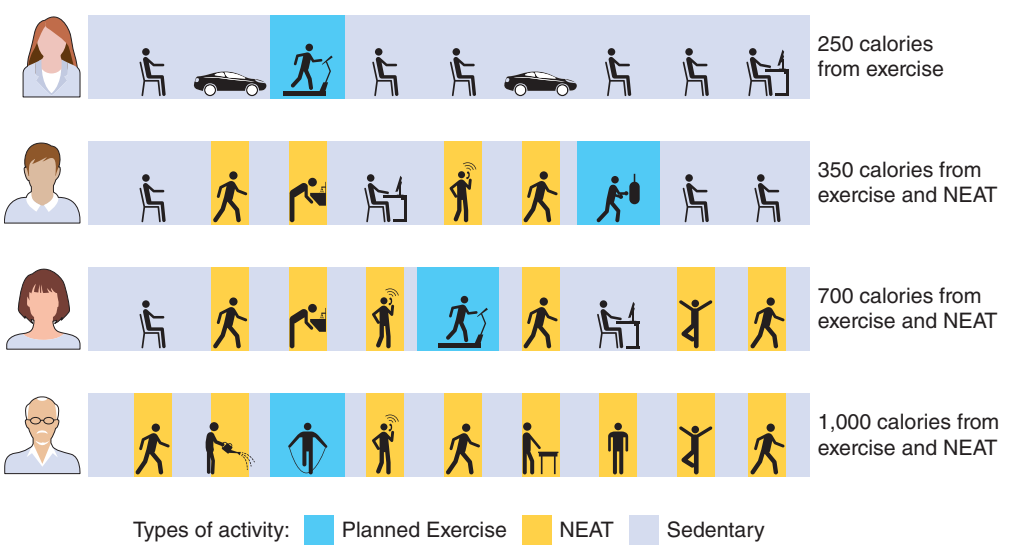
Hoeger Key to Wellness

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 increased.

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, while a sedentary person who changes caloric intake will see those changes amplified, as 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 (see Figure 1.4). People who spend most of the day working on their feet, such as medical assistants or stay-at-home parents, expend 700 daily calories more than a person with a sedentary desk job. People with physically demanding jobs, such as construction workers, can easily burn 1,600 daily calories more than a sedentary worker.[16] Variations in NEAT add up over

Figure 1.4 The importance of nonexercise activity thermogenesis (NEAT) and exercise.



days, months, and years and provide substantial benefits for weight management and health.

Beyond the workday are several hours of leisure time that can also be spent quite differently on a vast variety of physical activities, from light physical activities to sports and exercise that are **vigorous physical activity**. Regular **moderate physical activity** provides substantial benefits in health and well-being. For those who are already moderately active, even greater health benefits can be achieved by increasing the level of physical activity. 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.

1.4 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.*[17] A second edition of these guidelines was issued in 2018.

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.
- Adults should do 150 minutes (2 ½ hours) to 300 minutes (5 hours) a week of moderate-intensity aerobic (cardiorespiratory) physical activity or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 ½ hours) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity (also see Chapter 3). 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 physical activity beyond the equivalent 300 minutes (5 hours) of moderate-intensity activity per week.
- Adults should also do muscle-strengthening activities that involve all major muscle groups, performed 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 moderate- to vigorous-intensity physical activity every day.
- As part of their daily physical activity, children and adolescents should do vigorous-intensity activity on 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 2 hours and 30 minutes (150 minutes) 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.

The guidelines state that some adults should be able to achieve calorie balance with 150 minutes of moderate physical activity in a week, while others will find they need more than 300 minutes per week.[18] This recommendation is based on evidence indicating that people who maintain healthy weight typically accumulate 1 hour of daily physical activity.[19] Between 60 and 90 minutes of moderate-intensity physical activity daily is recommended to sustain weight loss for previously overweight people.[20] And 60 to 90 minutes of activity per day provides additional health benefits.

GLOSSARY

Exercise A type of physical activity that requires planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness.

Physical activity Bodily movement produced by skeletal muscles that requires energy expenditure and produces progressive health benefits.

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

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

Vigorous physical activity An activity similar to jogging that causes rapid breathing and a substantial increase in heart rate.

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

1.5 Benefits of Physical Fitness

The benefits to be enjoyed from participating in a regular fitness program are many. In addition to a longer life (see Figures 1.5 and 1.6), the greatest benefit of all is that physically fit people who lead a positive lifestyle have a healthier and better quality of life. These people live life to its fullest and have fewer health problems than inactive individuals who also indulge in negative lifestyle habits. Compiling an all-inclusive list of the benefits to be reaped through participation in a fitness program is a challenge, but the list provided in Figure 1.7 summarizes many of these benefits.

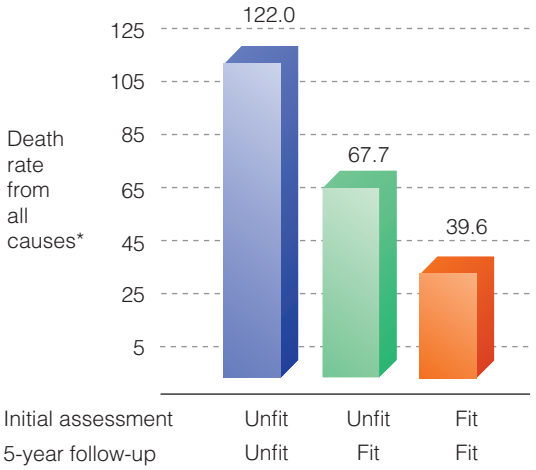
In addition to the benefits listed in Figure 1.7, **epidemiological** research studies linking physical activity habits and mortality rates have shown lower premature mortality rates in physically active people. Pioneering work in this area demonstrated that as the amount of weekly physical activity increased, the risk of cardiovascular death decreased.[21] In this study, conducted among 16,936 Harvard alumni, the greatest decrease in cardiovascular deaths was observed in alumni who burned more than 2,000 calories per week through physical activity.

A landmark study subsequently upheld the findings of the Harvard alumni study.[22] Based on data from 13,344 individuals who were followed over an average of 8 years, the results confirmed that the level of cardiorespiratory fitness is related to mortality from all causes. These findings showed a graded and consistent inverse relationship between physical fitness and mortality, regardless of age and other risk factors.

In essence, the higher the level of cardiorespiratory fitness, the longer the life (see Figure 1.5). The death rate from all causes for the low-fit men was 3.4 times higher than for the high-fit men. For the low-fit women, the death rate was 4.6 times higher than for the high-fit women. The study also reported a greatly reduced rate of premature deaths even at moderate fitness levels, which most adults can achieve easily. People gain further protection when they combine higher fitness levels with a reduction in other risk factors such as hypertension, elevated cholesterol, cigarette smoking, and excessive body fat.

Additional research that looked at changes in fitness and mortality found a substantial (44 percent) reduction in mortality risk when the study participants abandoned a sedentary lifestyle and became moderately fit (see Figure 1.6).[23] The lowest death

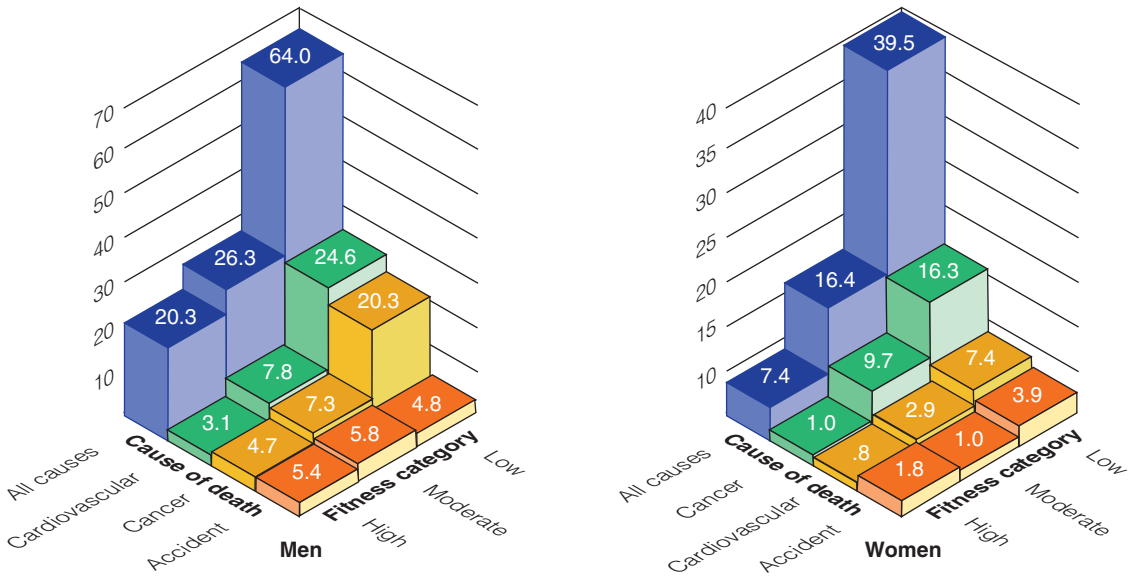
Figure 1.6 Effects of fitness changes on mortality rates.



*Death rates per 10,000 man-years observation.

SOURCE: S. N. Blair et al., "Changes in Physical Fitness and All-Cause Morality: A Prospective Study of Healthy Men and Women," *Journal of the American Medical Association* 273 (1995): 1193–1198.

Figure 1.5 Death rates by physical fitness levels.



SOURCE: Based on data from S. N. Blair, H. W. Kohl III, R. S. Paffenbarger, Jr., D. G. Clark, K. H. Cooper, and L. W. Gibbons, "Physical Fitness and All-Cause Morality: A Prospective Study of Healthy Men and Women," *Journal of the American Medical Association* 262 (1989): 2395–2401.

Figure 1.7 Long- and short-term benefits of exercise.

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 achieve peak bone mass in young adults and maintain bone mass later in life, thereby decreasing the risk for osteoporosis.
- helps prevent chronic back pain.
- speeds recovery time following physical exertion.
- speeds recovery following injury or disease.
- improves posture and physical appearance.

- helps maintain recommended body weight.
- increases resting metabolic rate.
- helps preserve lean body tissue.
- improves the body's ability to use fat during physical activity.

- regulates and improves overall body functions.
- retards creeping frailty, reduces disability, and helps to maintain independent living in older adults.
- 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.
- extends longevity and slows the aging process.

- improves and helps maintain cognitive function, decreasing the risk for dementia and Alzheimer's disease.

- helps people sleep better.
- relieves tension and helps in coping with life stresses.
- raises levels of energy and job productivity.
- 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).
- improves physical stamina and counteracts chronic fatigue.
- enhances quality of life: People feel better and live a healthier and happier life.

Short-term (immediate/acute) Benefits of Exercise
(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.)

- 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.)
- improves joint flexibility.
- decreases arthritic pain.

- increases fat storage in muscle which can then be burned for energy.

- uses blood glucose and muscle glycogen.
- improves insulin sensitivity (decreasing the risk of type 2 diabetes).
- immediately enhances the body's ability to burn fat.
- lowers blood lipids.
- reduces low-grade (hidden) inflammation.
- 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.)
- decreases blood pressure the first few hours following exercise.
- improves digestion.
- improves resistance to infections.

- improves brain function.

- increases endorphins (hormones), which are naturally occurring opioids that are responsible for exercise-induced euphoria.
- enhances mood and self-worth.
- provides a sense of achievement and satisfaction.
- leads to muscle relaxation.
- decreases stress.
- promotes better sleep (unless strenuous exercise is performed too close to bedtime).
- boosts energy levels.

rate was found in people who were fit and remained fit, and the highest rate was found in men who remained unfit.

While it is clear that moderate-intensity exercise provides substantial health benefits, research data also show a dose-response relationship between physical activity and health. Vigorous-intensity and longer-duration activities 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 150 to 300 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.[24] We are learning that even individuals who feel short on time can gain major ground in their desire to boost physical fitness by participating in high-intensity interval training one to three times per week (for specific recommendations see Chapter 4 pages 60–62).

As compared with prolonged moderate-intensity activity, vigorous-intensity exercise has been shown to provide the best improvements in aerobic capacity, coronary heart disease risk reduction, and overall cardiovascular health.[25] A word of caution, however, is in order. Vigorous exercise should be reserved for healthy individuals who have been cleared to participate (see Activity 1.1) and who have been participating regularly in at least moderate-intensity activities.

While most of the chronic (long-term) benefits of exercise are well-established, what many people fail to realize is that there are *immediate benefits* derived by participating in just one single bout of exercise. Most of these benefits dissipate within 48 to 72 hours following exercise. The acute (immediate) benefits, summarized in Figure 1.7, 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, you will realize the impressive long-term benefits listed in Figure 1.7 as well.

1.6 Types of Physical Fitness

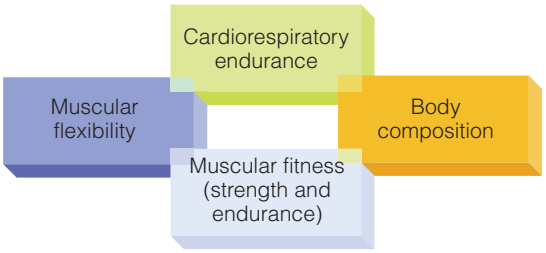
Individuals are physically fit when they can meet both the ordinary and the unusual demands of daily life safely and effectively without being overly fatigued and still have energy left for leisure and recreational activities. **Physical fitness** can be classified into health-related and performance-related fitness.

Health-Related Fitness

Health-related fitness has four components: cardiorespiratory endurance, muscular fitness, muscular flexibility, and body composition (see Figure 1.8).

1. *Cardiorespiratory endurance:* The ability of the heart, lungs, and blood vessels to supply oxygen to the cells to meet the demands of prolonged physical activity (also referred to as aerobic exercise).
2. *Muscular fitness (muscular strength and muscular endurance):* The ability of the muscles to generate force.
3. *Muscular flexibility:* The achievable range of motion at a joint or group of joints without causing injury.
4. *Body composition:* The amount of lean body mass and adipose tissue (fat mass) in the human body.

Figure 1.8 Health-related components of physical fitness.

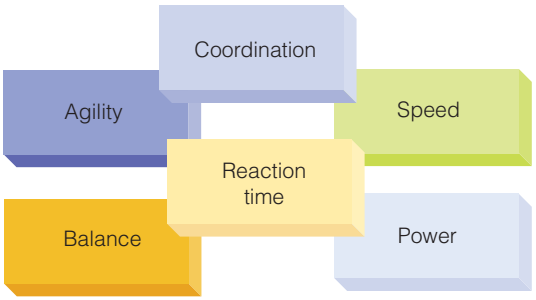


Performance-Related Fitness

Fitness in motor skills is essential in activities such as basketball, racquetball, golf, hiking, soccer, and water skiing. Good performance-related fitness also enhances overall quality of life by helping people cope more effectively in emergency situations (see Chapters 4 and 5). The components of **performance-related fitness** are agility, balance, coordination, power, reaction time, and speed (see Figure 1.9).

1. *Agility:* The ability to change body position and direction quickly and efficiently. Agility is important in sports such as basketball, soccer, and racquetball, in which the participant must change direction rapidly and at the same time maintain proper body control.
2. *Balance:* The ability to maintain the body in equilibrium. Balance is vital in activities such as gymnastics, diving, ice skating, skiing, and even football and wrestling, in which the athlete attempts to upset the opponent's equilibrium.
3. *Coordination:* Integration of the nervous system and the muscular system to produce correct, graceful, and harmonious body movements. This component is important in a wide variety of motor activities such as golf, baseball,

Figure 1.9 Performance-related components of physical fitness.



karate, soccer, and racquetball, in which hand-eye or foot-eye movements, or both, must be integrated.

4. *Power:* The ability to produce maximum force in the shortest time. The two components of power are speed and force (strength). An effective combination of these two components allows a person to produce explosive movements such as those required in jumping; putting the shot; and spiking, throwing, and hitting a ball.
5. *Reaction time:* The time required to initiate a response to a given stimulus. Good reaction time is important for starts in track and swimming; for quick reactions when playing tennis at the net; and in sports such as table tennis, boxing, and karate.
6. *Speed:* The ability to propel the body or a part of the body rapidly from one point to another. Examples of activities that require good speed for success are soccer, basketball, stealing a base in baseball, and sprints in track.

In terms of preventive medicine, the main emphasis of fitness programs should be on the health-related components. Performance-related fitness is crucial for success in sports and athletics, and it also contributes to wellness. Improving performance-related fitness affords an individual more enjoyment and success in lifetime sports, and regular participation in performance-related fitness activities also helps develop health-related fitness. Further, total fitness is achieved by taking part in specific programs to improve health-related and performance-related components alike.

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Good skill-related fitness enhances success in sports performance.

1.7 Wellness

After the initial fitness boom swept across the United States in the 1970s, it became clear that improving physical fitness alone was not always enough to lower the risk for disease and ensure better health. Once the idea took hold that fitness by itself would not necessarily decrease the risk for disease and ensure better health, the wellness concept developed in the 1980s. As the years go on, research continues to illuminate how tightly interwoven our physical and mental lifestyle choices are, down to the level of cellular function.

Good health should not be viewed simply as the absence of illness. Wellness implies a constant and deliberate effort to stay healthy, avoid **risk factors**, and achieve the highest potential for well-being. In order to live a wellness way of life, individuals must view themselves as someone whose well-being is their ultimate responsibility. Though the statement may sound obvious, the reverse is often true. Too often people are more likely to care for family members or even pets with greater responsibility than they care for themselves. A wellness way of life requires that each of us make deliberate efforts to care for ourselves.

To enjoy a **wellness** lifestyle, a person has to practice behaviors that will lead to positive outcomes in seven dimensions of wellness: physical, emotional, intellectual, social, environmental, spiritual, and occupational (Figure 1.10). These dimensions are interrelated; one frequently affects the others. A person who justifies irregular sleep patterns may also be weakening the immune system and encouraging weight gain. An elderly person who is lonely will be at increased risk for coronary heart disease and stroke.[26] As a positive example, a person who dedicates fifteen minutes a day to meditating on compassionate thoughts towards themselves and others may be less susceptible to stress, depression, and some types of chronic pain.[27] And a person who

GLOSSARY

Epidemiological Of the study of epidemic diseases.

Physical fitness The general capacity to adapt and respond favorably to physical effort.

Health-related fitness A physical state encompassing cardiorespiratory endurance, muscular fitness, muscular flexibility, and body composition.

Performance-related fitness Components of fitness important for successful motor performance in athletic events and in lifetime sports and activities.

Risk factors Characteristics that predict the chances for developing a certain disease.

Wellness The constant and deliberate effort to stay healthy and achieve the highest potential for well-being.

Danielle Macinnes

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

practices certain mind-body exercises, including yoga, may stop the expression of genes that cause chronic inflammation.[28]

The concept behind the seven dimensions of wellness shows that high-level wellness clearly goes beyond optimum fitness and the absence of disease. Wellness incorporates fitness, proper nutrition, stress management, disease prevention, social support, self-worth, nurturance (a sense of being needed), spirituality, personal safety, substance control and not smoking, regular physical examinations, health education, and environmental support. Additional information on wellness and how to implement a wellness program is given in Chapter 9.

Figure 1.10 Dimensions of wellness.

1.8 The Path to Fitness and Wellness

Because fitness and wellness needs vary from one person to another, exercise and wellness prescriptions must be personalized for best results. This book provides the necessary guidelines for developing a lifetime program to improve fitness and promote preventive health care and personal wellness. As you study the book and complete the assignments in each chapter, you will learn to

- Determine whether medical clearance is required for you to participate safely in exercise.
- Assess your overall level of physical fitness, including cardiorespiratory endurance, muscular fitness, muscular flexibility, and body composition.
- Prescribe personal programs for total fitness development.
- Use behavior modification techniques that will allow you to change unhealthy lifestyle patterns.
- Develop sound diet and weight-control programs.
- Implement a healthy lifestyle program that includes prevention of cardiovascular diseases and cancer, stress management, and smoking cessation, if applicable.
- Discern myths from facts pertaining to exercise and health-related concepts.

1.9 A Word of Caution Before You Start Exercise

Even though exercise testing and participation are relatively safe for most apparently healthy individuals, a small but real risk exists for exercise-induced abnormalities in people with a history of cardiovascular problems and those who are at higher risk for disease. These people should be screened before initiating or increasing the intensity of an exercise program.

Before you engage in an exercise program or participate in any exercise testing, at a minimum you should fill out the Health History Questionnaire found in Activity 1.1. A "yes" answer to any of these questions may signal the need for a physician's approval before you participate. If you don't have any yes responses, you may proceed to Chapter 3 to assess your current level of fitness.

Assess Your Behavior

1. Are you aware of lifestyle factors that may negatively impact your health?
2. Do you accumulate at least 30 minutes of moderate-intensity physical activity 5 days per week?
3. Do you participate in vigorous-intensity physical activity a minimum of two times per week?
4. Do you make an effort to stay active throughout the day and avoid uninterrupted periods of sitting?

Assess Your Knowledge

1. Bodily movement produced by skeletal muscles is called
   a. physical activity.
   b. kinesiology.
   c. exercise.
   d. aerobic exercise.
   e. muscle strength.
2. The *Physical Activity Guidelines for Americans* state that adults between 18 and 64 years of age should
   a. do 2 hours and 30 minutes to 5 hours a week of moderate-intensity aerobic physical activity.
   b. do 1 hour and 15 minutes to 2 hours and 30 minutes a week of vigorous-intensity aerobic physical activity.
   c. do a combination of moderate- and vigorous-intensity aerobic physical activity equivalent to that listed under choices a and b above.
   d. move more frequently and sit less throughout the day.
   e. All of the above choices are correct.
3. The leading cause of death for people ages 1-44 in the United States is
   a. cancer.
   b. diseases of the cardiovascular system.
   c. chronic lower respiratory disease.
   d. accidents.
   e. diabetes.
4. 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. metabolic fitness.
5. Which of the following is not a component of health-related fitness?
   a. cardiorespiratory endurance
   b. body composition
   c. agility
   d. muscular fitness
   e. muscular flexibility
6. 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 least fit and moderately fit groups.
   c. the good and high fitness groups.
   d. the moderately fit and good fitness groups.
   e. The drop is similar among all fitness groups.
7. 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 ideal body weight
8. In the United States, the leading cause of death for teens is
   a. cancer.
   b. heart disease.
   c. autoimmune disorder.
   d. automobile accidents.
   e. allergic reactions.
9. Nonexercise activity thermogenesis (NEAT)
   a. includes activities such as walking to work and grocery shopping.
   b. is not important to overall wellness.
   c. refers to the body's metabolic activity while sleeping.
   d. should be reserved for individuals who have already achieved a base fitness level.
   e. can replace an exercise routine.
10. Immediate benefits of exercise include
    a. lowered blood lipids.
    b. improved insulin sensitivity.
    c. reduced low-grade inflammation.
    d. None of the above. Answers a–c are long-term benefits of exercise only.
    e. Answers a–c are all correct choices.

Correct answers can be found on page 270.

Activity 1.1 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. Shortness of breath
- ☐ 7. An abnormal resting or stress electrocardiogram
- ☐ 8. Uneven, irregular, or skipped heartbeats (including a racing or fluttering heart)
- ☐ 9. A blood embolism
- ☐ 10. Thrombophlebitis
- ☐ 11. Rheumatic heart fever
- ☐ 12. Elevated blood pressure
- ☐ 13. A stroke
- ☐ 14. Diabetes
- ☐ 15. A family history of coronary heart disease, syncope, or sudden death before age 60
- ☐ 16. 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:

_____

_____

_____

Student's Signature: _____ **Date:** _____

An additional comprehensive pre-participation health history questionnaire, the PAR-Q & You, can be accessed on MINDTAP at www.cengage.com

2

To reach a goal you have never before attained, you must do things you have never before done. —Richard G. Scott

Pablo Guerrero

Behavior Modification

OBJECTIVES

2.1 **Learn** motivational and behavior modification techniques to enhance compliance with a healthy lifestyle program.

2.2 **Explain** the importance of personal values and long-term goals.

2.3 **Learn** to write SMART goals to aid with the process of change.

Real Life Story LaTisha's Experience

During my first three years of college I felt that I was living a reactionary life. I was constantly losing sleep to catch up on deadlines, going out for fast food when my roommates did, and getting pulled in by alerts on my phone when I had planned to go to the gym. When I moved away for my third summer, I realized how burnt out I had become. I resolved that when I returned to school in the fall, I would prioritize sleep and exercise. In a freshman class I had learned about the importance of helping relationships when looking to change behavior. I wasn't sure my previous roommates would be supportive of my goals, so I looked for other people who would be. I returned to campus two weeks before school to join a road cycling group. I also recruited friends through social media who would cheer me on my goal of getting regular sleep. I started strong with my goals, but definitely had setbacks once the semester began. However, being accountable to my cycling group helped me remember my resolution, and by the end of the semester I was cycling with friends three times per week and getting consistent sleep. I found that my confidence and my school work improved as well. I am grateful that I found friends who value the lifestyle that I now do.

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The benefits of regular physical activity and living a healthy lifestyle to achieve wellness are well documented. Most people who fail to exercise, eat well, and get regular sleep do not do so because of lack of understanding or interest. Most people see a need to incorporate these choices into their lives, but making change is difficult (see Figure 2.1). To understand why this is so, one has to examine what motivates people and what actions are required to make permanent changes in behavior, which are called **behavior modification**.

Consider your own first-hand experience with behavior modification: some of your decisions begin with planning a course of action and end with simply following through. You may tell yourself to wake up to your alarm for a job interview and then wake up as planned. With other decisions, you are not able to simply compel your own obedience. You may decide not to procrastinate on a large project, but then find that decision is difficult to carry out.

Changing your own behavior is a complex process, and it is important to be patient with yourself. You are grappling with your own nature, preferences, talents, and limitations. You are working within the framework of values you have adopted over a lifetime, and you are complying with the values held by the people closest to you. Further, you live in a culture and environment that makes some choices easier and others harder. Yet gaining the ability to create positive change in your life, to learn from your mistakes, and to adjust your course for the future is not only achievable but is also a rewarding and fulfilling endeavor.

Get It Done Behavior Modification Planning

Healthy Lifestyle Habits

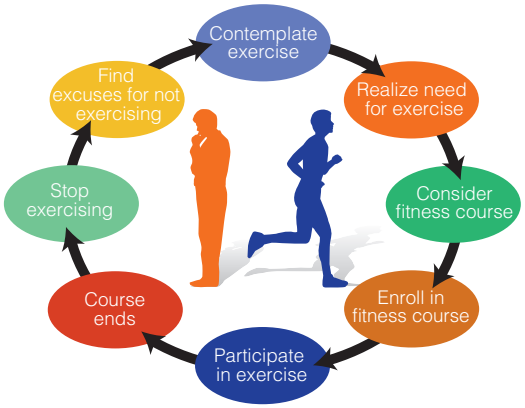
Research indicates that adherence to the following 12 lifestyle habits will significantly improve health and extend life:

1. Participate in a lifetime physical activity program.
2. Do not smoke cigarettes.
3. Eat right.
4. Avoid snacking.
5. Maintain recommended body weight through adequate nutrition and exercise.
6. Sleep 7 to 8 hours each night.
7. Lower your stress levels.
8. Drink alcohol moderately or not at all.
9. Surround yourself with healthy friendships.
10. Seek to live and work in a healthy environment.
11. Use the mind: Keep your brain engaged throughout life to maintain cognitive function.
12. Take personal safety measures to lessen the risk for avoidable accidents.

Try It

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

Figure 2.1 Exercise/exercise dropout cycle.



2.1 Values and Behavior

Decisions about values are the groundwork for accomplishment. You cannot choose a goal that is powerful and motivating to you until you recognize what attributes you value enough to make the necessary sacrifices. Values are defined as the core beliefs and ideals that people have. Values govern priorities. Life is full of trade-offs, and values decide which opportunities will be sacrificed for others that are viewed as more important. Values govern behavior as people look to conduct themselves in a manner that is conducive to living and attaining goals consistent with their beliefs and what is important to them. A person's values reflect who they are.

The only way to truly understand your own personal values is to observe how you act. What activities do you sacrifice to make room for others? Values are established through experience and learning, and their development is a lifelong process. Values are first developed within a person's family circles, immediate community, and media and wider culture, according to what is acceptable or unacceptable, desirable or undesirable, and rewarded or ignored/punished.

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The development of values is a lifelong process.

Educational experiences play a key role in the establishment of values. Education is power: It provides people with knowledge to form opinions and allows them to better internalize and visualize future outcomes from today's choices. This is especially important because human nature is to focus on the present when making decisions, to give extra weight to immediate benefits and immediate feedback rather than to greater positive impact. Education shifts more mental vision to future outcomes of today's choices. By better understanding future rewards, you may increase the pleasure you associate with the thought of earning them, making immediate tangible rewards easier to sacrifice. Education forces people to question issues and take stands.

Values are also learned through examples and role models. According to behavioral scientists, people have a need to maintain a positive view of themselves, which is why it is often helpful and pleasant for people to associate themselves with positive role models. As people look to develop values, they typically search for and emulate people of high ethical values and accomplishments that make them feel positive both about the people whose behaviors they are trying to emulate and themselves.

If you are unhappy with your values, what can you do to change them? Core values change throughout life based on education and the physical and social environment in which people live. Surrounding yourself with people who value what you hope to value can encourage you in your goal. Sometimes simply finding a supportive group in something like a gym class, cooking group, or hiking group can be a great help. Often, deliberate effort is required to be in an environment that rewards the behaviors the individual is trying to adopt. Education is also key. Learning and gaining a belief about a particular issue is most critical in the establishment of values. For example, individuals who lead a sedentary lifestyle and never exercise lack an understanding of and don't experience the myriad benefits and vibrant quality of life obtained through fitness participation. Their decision not to exercise may be partly due to negative feelings and associations that intuitively arise when they think about exercise. Behavioral scientists refer to these immediate associations as **affect**.

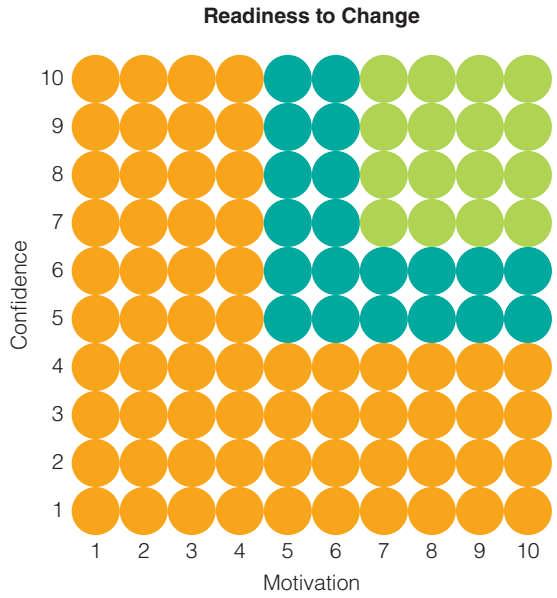
Through a book, a class, sports participation, or a friend, the person may first be exposed to exercise and an active lifestyle. The individual may then seek an environment where he/she can learn about and actively participate in a physical activity or exercise program. The feelings of well-being and increased health, functional capacity, and quality of life and the education gained about the benefits of fitness in turn become the reward for program participation. The individual now associates exercise with positive feelings and a positive view of themselves.

GLOSSARY

Behavior modification The process used to permanently change negative behaviors in favor of positive behaviors that will lead to better health, well-being, and productive life.

Affect Immediate associations and feelings (either positive or negative) that influence choices.

Figure 2.2 Readiness to change according to confidence and motivation.



Adapted from Harvard Men's Health Watch, "Trade Bad Habits for Good Ones," December 2016. Available at http://www.health.harvard.edu/staying-healthy/trade-bad-habits-for-good-ones.

Your Unique Individuality and Nature

It is important to take on goals that are meaningful to you (not to someone else) and that you feel confident you can achieve. Begin by asking yourself what has been bothering you. Then list the steps you would need to fix that behavior. Now ask yourself whether you would truly be willing to take those steps. Use Figure 2.2 to rate your confidence that you can achieve your goal using a scale of one to ten, with ten being fully confident. Next, rate your motivation on a scale of one to ten, with ten being extremely motivated. If both motivation and confidence rate as a six or higher, the goal is worth pursuing. If not, you are likely still in a contemplation stage for your goal.

Work with your unique nature and interests rather than ignoring them. Visualize that you are playing the role of Human Resources, trying to recruit yourself. Negotiate a goal that is meaningful to you and incentives that will excite you. Visualize the very first steps toward reaching your goal. Be wide open to options as you consider what motivates you. Avoid making harsh judgments about what you should or should not need to motivate yourself. Rather, ask yourself what incentives will actually work for you. Tailor-fit your steps and incentives.

2.2 Your Brain and Your Habits

Habits are a necessary tool for everyday brain function. Our minds learn to use familiar cues to carry out automatic behavior that has worked successfully in the past. While we carry out these automatic behaviors, we allow our minds to spend energy working on other tasks and puzzling through other problems. If you've ever found yourself driving a familiar route when you had intended to turn off and drive elsewhere, you are performing a habit.

Habits happen in familiar environments and not in new environments. Habits, however, can be changed by deliberate choice. During times of stress or when our minds are preoccupied with other problems, we are much more prone to return to and rely on habits, good or bad, and we are less likely to consider deliberate choice, core values, and long-term goals. Members of Alcoholics Anonymous are instructed, for example, that they are less likely to relapse if they can avoid situations where they become hungry, angry, lonely, or tired (H.A.L.T.).

Hoeger Key to Wellness

During times of stress or when our minds are preoccupied with other problems, we are much more prone to return to and rely on habits, good or bad, and we are less likely to consider long-term goals.

There is a biological explanation for the way habits go from planned to automatic behavior. The area of our brain where habits are formed is activated by events that are rewarding, exciting, unexpected, and intense, as well as by cues from the environment that are associated with those events. That part of the brain then memorizes events that are pleasurable and rewarding and helps the individual seek opportunities to repeat those events again in the future. As these behaviors become ingrained in the brain, we lose awareness as they are carried out. Once we recognize the familiar trigger, we often follow the habit, whether it is helpful or detrimental, and therefore often sabotage the desire for willful change.

Changing Habits through Mindfulness and Repetition

There are steps you can take to change unwanted behaviors that have been ingrained in the brain or to create helpful behaviors. First, recognize that there are biological processes that lead to behavioral habits. Take note of the situational cues or stressful experiences that trigger a habit. Researchers have found that 45 percent of our behaviors are conducted in uniform contexts and locations from day to day.[1]

As you are adopting a new habit, repetition is critical. You must also consciously prepare to eliminate bad habits such as eating while watching television. Instead, use commercial breaks as a cue to stand up and find a quick household task that requires movement. Finally, realize that excessive stress (distress—see Chapter 8) often triggers old habits. For example, an argument with a roommate may lead to excessive time watching a TV series while eating unhealthy food. You must prepare for an adequate response in these situations. If you made a mistake and did not adequately respond to that specific situation, chalk it up to experience, use it as a learning tool, and next time come back with the proper response.

Changing Habits by Focusing on Long-Term Values

Understanding how to create and break habits through mindfulness and repetition is a powerful tool. There are greater forces at work in behavioral change than just pathways of automatic behavior, however. Those greater forces are our core values and understanding of who we are and what greater long-term desires we hold. Change in core values often overrules instant rewards as we seek long-term gratification. This ability to change according to values also has a biological explanation.

An entirely separate portion of the brain, sometimes referred to as the executive portion, is responsible for putting the brakes on impulsive behavior that may be harmful. It also is responsible for personality expression, social behavior, and complex thought processing. It reminds us of who we are and of our long-term goals. When you find yourself leaving your warm, comfortable bed in the morning to go to work, you are experiencing the executive portion of your brain at work, placing long-term desires ahead of short-term urges.

As you work to change behavior, you will notice competing desires, especially as you begin change. Find ways to guide yourself toward new behaviors by first recognizing that you have two desires, a short-term urge and a long-term desire. Take a few extra minutes to understand and visualize the reward you are seeking, and to educate yourself about the best way to obtain it. Remind yourself often of your core values, and look for opportunities throughout the day to align your behaviors with those core values. People can improve their chances of overcoming urges for unhealthy behavior by simply being in a frame of mind where they are thinking of the long-term benefits.

2.3 Planning and Willpower

Understanding the concept of willpower, or self-control, is helpful in the process of behavioral change. Many scientists believe that self-restraint against impulses can be built, like a muscle, if built slowly and gradually. Research suggests starting with something small. If you feel you need to read every text message the moment it arrives, you may try to learn to wait a few minutes and finish the activity you are working on and then read your text message. As you do so, you find you are able to carry out your new behavior with positive results, and your ability to exert self-control over that behavior increases.

The most effective use of willpower may be its use as a planning tool. Individuals who plan ahead, whether it is their weekly schedule or their response in a certain situation, are able to align behavior with their long-term desires. Planning ahead allows individuals to be conscientious about their choices.

Any new behavior you are trying to adopt should be equated with your own personal long-term values (see the section on SMART goals on page 25 of this chapter). One series of studies enlisted participants who were attempting to make healthy lifestyle changes. When participants met with temptation, they were instructed to respond with a phrase: Half the participants were instructed to say "I don't" and the other half were instructed to say "I can't." For example, when met with temptation, an individual may say something like "I don't check text messages while driving," versus "I can't check text messages while driving." Or an individual may say, "I don't buy food that has trans fat," versus "I can't buy food that has trans fat." The phrase "I don't" was chosen by researchers because it connotes self-driven change, while the phrase "I can't" connotes restrictions from an outside source.

The large majority of participants who used the phrase "I don't," which connotes self-driven change, were successful at their chosen behavior change. Those who used the phrase "I can't" were likely to be unsuccessful. The phrase "I don't" helped participants connect the new behavior with their own long-term goals and desires and kept them from feeling that behavior was an imposed restriction.[2]

Willpower is believed by some scientists to be a limited daily resource.[3] Some suggest it is highest in the morning and is depleted as we use it throughout the day, primarily when confronted with difficult challenges and stress. Some behavioral scientists suggest that the simple belief that willpower is limited will make an individual underestimate human resilience and become more tempted to give up on a goal.[4]

Perhaps the best advice is taken from both points of view. When you are planning to take on a significant task, help yourself be successful by choosing a time when you can put aside as many other demands and stressors as possible. And when you meet a failure, do not give up. Instead, become a person who pushes past failure and recognizes failure for what it is: a natural process of learning on the way to success.

Studies indicate that willpower reserve can be increased through exercise, balanced nutrition, a good night's sleep, and quality time spent with important people in your life. On the other hand, willpower decreases in times of depression, anxiety, anger, and loneliness.

Growth versus Fixed Mindset

Scientists who warn against viewing willpower as a limited resource do so because they understand the importance of a growth mindset. Individuals are more successful when they are taught that growth is possible for an individual's willpower, creativity, work ethic, intelligence, and other changeable traits. This understanding that traits are changeable is referred to as a growth mindset. Individuals with a growth mindset show an increased capacity to learn and improve. Conversly, people who are taught that changeable traits are fixed at birth do not perform as well and give up more quickly.[5] People with a fixed mindset believe they were born either with or without the ability to master a skill, and they believe that their own efforts will not improve their chance of success. A growth mindset places value on effort, however, rather than linking a person's self-valuation to results. This focus on effort has far-reaching effects throughout the individual's life.

Implementation Intentions

Another simple way to keep your values foremost in your mind is by using a research-based strategy that behavior scientists call implementation intentions.[6] The strategy itself is what you might expect from the name. You consider a situation in which you are likely to encounter temptation. You then make a plan for the action you will take when faced with that situation. When

the situation arises, you are much more likely to succeed with your goal by implementing the planned behavior. For example, if a friend comes into town on a day you plan to exercise, you can opt for a hike together in place of your workout.

Hoeger Key to Wellness

A simple way to keep your values foremost in your mind is to use 'implementation intentions.' Imagine possible obstacles to your goals, then visualize specific actions you will take to overcome those obstacles.

2.4 Motivation and Locus of Control

Motivation often explains why some people succeed and others do not. Although motivation comes from within, external factors are what trigger the inner desire to accomplish a given task. These external factors, then, control behavior.

Understanding **locus of control** is helpful to the study of motivation. People who believe they have control over events in their lives are said to have an internal locus of control. People with an external locus of control, in contrast, believe that what happens to them is a result of chance or environmental factors and is unrelated to their behavior.

People with an internal locus of control are apt to be healthier and have an easier time initiating and adhering to a wellness program than those who perceive that they have little control and think of themselves as powerless and vulnerable. People with an external locus of control also are at greater risk for illness. When illness does strike, restoring a sense of control is vital to regaining health.

Few people have either a completely external or a completely internal locus of control. They fall somewhere along a continuum. The more external, the greater is the challenge in changing and adhering to exercise and other healthy lifestyle behaviors. Fortunately, a person can develop a more internal locus of control. Understanding that most events in life are not determined genetically or environmentally helps people pursue goals and gain control over their lives. Three impediments, however, can keep people from acting on their desire to change: problems of competence, confidence, and motivation.

1. *Problems of competence.* Lacking the skills to perform a task leads to reduced competence. If your friends play basketball regularly but you don't know how to play, you might be inclined not to participate. The solution to this problem of competence is to master the skills you require to participate. Don't be afraid to try new activities. Another alternative is to select an activity in which you have natural aptitude. It may not be basketball, but it well could be weight lifting.
2. *Problems of confidence.* Problems with confidence arise when you have the skill but don't believe you can get it done. Fear and feelings of inadequacy often interfere with the ability to perform the task. You shouldn't talk yourself out of something until you have given it a fair try. Initially, try to visualize yourself doing the task and getting it done. Repeat this several times, then actually try it. You will surprise yourself.

   Sometimes, lack of confidence arises when the task seems insurmountable. In these situations, dividing a goal into smaller, more realistic objectives helps to accomplish the task.
3. *Problems of motivation.* With problems of motivation, both the competence and the confidence are there, but individuals are unwilling to change because the reasons for change are not important to them. For example, a person begins contemplating a smoking cessation program when the reasons for quitting outweigh the reasons for smoking.

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Many people refrain from physical activity because they lack the necessary skills to enjoy and reap the benefits of regular participation.

2.5 Changing Behavior

The first step in addressing behavioral change is to recognize that indeed a problem exists. Five general categories of behaviors are addressed in the process of willful change:

1. Stopping a negative behavior
2. Preventing relapse of a negative behavior
3. Developing a positive behavior
4. Strengthening a positive behavior
5. Maintaining a positive behavior

Changing chronic, unhealthy behaviors to stable, healthy behaviors is often challenging. Change usually does not happen all at once but, rather, is a lengthy process with several stages.

The simplest model of change is the two-stage model of unhealthy behavior and healthy behavior. This model states that either you do it or you don't. Most people who use this model attempt self-change but end up asking themselves why they're unsuccessful: They just can't do it (start and adhere to exercise

or quit smoking, for example). Their intention to change may be good, but to accomplish it, they need knowledge about how to achieve change. The following discussion may help.

The Transtheoretical Model for Changing Behavior

The transtheoretical model, developed by psychologists James Prochaska, John Norcross, and Carlo DiClemente, is based on the theory that change is a gradual process that involves several stages. The model is used most frequently to change health-related behaviors such as physical inactivity, smoking, poor nutrition, weight problems, stress, and alcohol abuse.

The five stages of change are precontemplation, contemplation, preparation, action, and maintenance. A sixth stage of change, termination/adoption, was subsequently added to this model.

After years of study, researchers found that applying specific behavior-change techniques during each stage of the model increases the rate of success for change. Understanding each stage of this model will help you determine where you are in relation to your personal healthy-lifestyle behaviors. It also will help you identify techniques to make successful changes.

Precontemplation

Individuals in the **precontemplation stage** are not considering change or do not want to change a given behavior. They typically deny having a problem and have no intention of changing in the immediate future. These people are usually unaware or underaware of the problem. Other people around them—including family, friends, health care practitioners, and coworkers—however, identify the problem clearly. Precontemplators do not care about the problem behavior and may even avoid information and materials that address the issue. Often, they actively resist change and seem resigned to accepting the unhealthy behavior as their fate.

Precontemplators are the most difficult people to inspire toward behavioral change. Many think that change isn't even a possibility. At this stage, knowledge is power. Educating them about the problem behavior is critical to help them start contemplating the process of change. Typically, they initiate change only when their values change, their feelings are addressed, or people they respect or job requirements pressure them to do so.

Contemplation

In the **contemplation stage**, people acknowledge that they have a problem and begin to think seriously about overcoming it. Although they are not quite ready for change yet, they are weighing the pros and cons. People may remain in this stage for years, but in their mind they are planning to take some action within the next 6 months or so. Education and peer support are valuable during this stage.

Preparation

In the **preparation stage**, people are seriously considering and planning to change a behavior within the next month. They are taking initial steps for change and may even try it for a short while—for instance, stopping smoking for a day or exercising a few times during this month. In this stage, people define a general goal for behavior change (say, to quit smoking by the last day of the month) and write specific actions to accomplish this goal (see the discussion on SMART goals, page 25). Continued peer and environmental support are recommended during the preparation phase.

Action

The **action stage** requires the most commitment of time and energy by the individual. Here, people are actively doing things to change or modify the problem behavior or to adopt a new healthy behavior. The action stage requires that the person follow the specific guidelines set forth for that specific behavior. For example, a person has actually stopped smoking completely, is exercising aerobically three times per week according to exercise prescription guidelines (see Chapter 4), or is maintaining a healthy diet.

Relapse, in which the individual regresses to a previous stage, is common during this stage. Once people maintain the action stage for six consecutive months, they move into the maintenance stage.

Maintenance

During the **maintenance stage**, the person continues to adhere to the behavior change for up to 5 years. The maintenance phase requires continuously adhering to the specific guidelines that govern the target behavior (for example, complete smoking cessation, aerobic exercise three times per week, or proper stress management techniques). At this time, a person works to reinforce the gains made through the various stages of change and strives to prevent lapses and relapses.

Termination/Adoption

Once a person has maintained a behavior more than 5 years, he or she enters the **termination/adoption stage** without fear of relapse. In the case of negative behaviors that have been

GLOSSARY

Motivation The desire and will to do something.

Locus of control The extent to which a person believes he or she can influence the external environment.

Precontemplation stage Stage of change in which people are unwilling to change their behavior.

Contemplation stage Stage of change in which people are considering changing behavior in the next 6 months.

Preparation stage Stage of change in which people are getting ready to make a change within the coming month.

Action stage Stage of change in which people are actively changing a negative behavior or adopting a new, healthy behavior.

Relapse Slipping or falling back into an unhealthy behavior(s) or failing to maintain healthy behaviors.

Maintenance stage Stage of change in which people maintain behavioral change for up to 5 years.

Termination/adoption stage Stage of change in which people have eliminated an undesirable behavior or maintained a positive behavior for more than 5 years.

Figure 2.3 Identifying your current stage of change.

Please indicate which response most accurately describes your current _____ behavior (in the blank space identify the behavior: smoking, physical activity, stress, nutrition, weight control, etc.). Next, select the statement below (select only one) that best represents your current behavior pattern. To select the most appropriate statement, fill in the blank for one of the first three statements if your current behavior is a problem behavior. (For example, you might say, "I currently smoke, and I do *not* intend to change in the foreseeable future," or "I currently *do not* exercise, but I am contemplating changing in the next 6 months.") If you have already started to make changes, fill in the blank in one of the last three statements. (In this case, you might say: "I currently *eat a diet high in fruits, vegetables, and grains,* but I have done so only within the last 6 months," or "I currently *practice adequate stress management techniques*, and I have done so for more than 6 months.") As you can see, you may use this form to identify your stage of change for any type of health-related behavior.

1. I currently _____, and I do not intend to change in the foreseeable future.
2. I currently _____, but I am contemplating changing in the next 6 months.
3. I currently _____ regularly but intend to change in the next month.
4. I currently _____, but I have done so only within the last 6 months.
5. I currently _____, and I have done so for more than 6 months.
6. I currently _____, and I have done so for more than 5 years.

STAGES OF CHANGE

1 = Precontemplation	4 = Action
2 = Contemplation	5 = Maintenance
3 = Preparation	6 = Termination/Adoption

terminated, this stage of change is referred to as termination. If the person has adopted a positive behavior for more than 5 years, this stage is designated the adoption stage. Many experts believe that after this period of time, any former addictions, problems, or lack of compliance with healthy behaviors no longer present an obstacle in the quest for wellness. The change has become a part of one's lifestyle. This phase is the ultimate goal for everyone who seeks a healthier lifestyle.

Use the form provided in Figure 2.3 to determine where you stand in respect to behaviors that you want to change or new ones that you wish to adopt. As you fill out this form, you will realize that you are at different stages for different behaviors. For instance, you may be in the termination stage for aerobic exercise and smoking and in the action stage for strength training, but only in the contemplation stage for a healthy diet. Realizing where you are with respect to different behaviors will help you design a better action plan for a healthy lifestyle.

Critical Thinking

What factors do you think keep you from participating in a regular exercise program? How about factors that keep you from managing your daily caloric intake?

Using the form provided in Activity 2.1, pages 27–28, select two behaviors that you have targeted for the next 3 months. Developing new behavioral patterns takes time, and trying to work on too many components at once most likely will lower your chances for success. Start with components in which you think you will have a high chance for success.

2.6 The Process of Change

Timing is important in the process of willful change. People respond more effectively to selected processes of change in keeping with the stage of change they have reached at any given time. Thus, applying appropriate processes at each stage of change enhances the likelihood of changing behavior permanently. The following description of 16 of the most common processes of change will help you develop a personal plan for change.

Consciousness-Raising

The first step in a behavior modification program is consciousness-raising. This step involves obtaining information about the problem so that you can make a better decision about the problem behavior. Possibly, you don't even know that a certain behavior is a problem, such as being unaware of saturated fat content in many fast-food items. Consciousness-raising may continue from the precontemplation stage through the preparation stage.

Social Liberation

Social liberation stresses external societal acceptance of and support for positive change. Individuals who receive cues that a new behavior will be accepted and supported in their community will be more likely to succeed at adopting that behavior. For example, a city bicycle-borrowing program signals that bicycling is encouraged by residents. A health-oriented cafeteria cues employees that healthful eating is valued by the employer. Advocacy groups, civic organizations, policy interventions, and self-help groups can also show societal support for positive behaviors.

Self-Analysis

The next process in modifying behavior is developing a decisive desire to do so, called self-analysis. If you have no interest in changing a behavior, you won't do it. You will remain a precontemplator or a contemplator. Take a moment to consider your values. Examine your beliefs and whether they help or hinder you from adopting a healthy lifestyle. Do you value ambition over a healthy lifestyle? Do you admire an artist or celebrity who abuses drugs? Do you value smoking because it has become part of your self-identity and helps you feel like part of your social group? In your self-analysis, you may want to prepare a list of reasons for continuing or discontinuing the behavior. When you relate better with the reasons for changing than the reasons for not changing, you are ready for the next stage—either the contemplation stage or the preparation stage.

Emotional Arousal

In emotional arousal, a person experiences and expresses feelings about the problem and its solutions. Also referred to as "dramatic release," this process often involves deep emotional experiences. Watching a loved one die from lung cancer caused by cigarette smoking may be all that is needed to make a person quit smoking. As in other examples, emotional arousal might be prompted by a dramatization of the consequences of drug use and abuse, a film about a person undergoing open-heart surgery, or a book illustrating damage to body systems as a result of unhealthy behaviors.

Vince Fleming

In many cases, goals that provide enjoyment and purpose will be incompatible with former, undesired behaviors.

Positive Outlook

Having a positive outlook means taking an optimistic approach from the beginning and believing in yourself. Behavioral scientists believe that the ability to remain positive is a trait that can be learned.[7] Following the guidelines in this chapter will help you design a plan so that you can work toward change and remain enthused about your progress. Studies of individuals who are trying to quit an addictive behavior have found that asking such persons to reconnect with positive and meaningful goals in their life greatly improves chances for success. In many cases, goals that will bring the person enjoyment and purpose will be incompatible with the undesired behaviors.

The Power of Positive Self-Talk

Individuals who are able to reframe problems in a positive way are better able to maintain health and well-being. They can approach imperfect situations productively. They are also able to practice self-compassion and treat themselves with the same kindness they would extend to other people. One way individuals can improve their outlook is by fostering the habit of positive self-talk. Individuals may not notice whether their self-talk leans positive or negative until they have monitored themselves for a time. For example, after a stressful week when you realize you have eaten poorly you may find yourself saying something negative, like, "Why do I think I can do these things? I can barely keep my life together, let alone eat well." Saying the phrase aloud may help you notice that your thought is destructive to your goal. Or by saying the phrase aloud, you may be happy to discover that you are thinking something positive, like, "That week was not easy, but I made it through. I certainly learned what does not work for me. I am going to use next week to reset and approach my days in a way that has worked well for me in the past."

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Commitment

Upon making a decision to change, you accept the responsibility to change and believe in your ability to do so. During the commitment process, you engage in preparation and may draw up a specific plan of action. Write down your goals and, if social commitment and support are important to you, share them with others or announce them. In essence, you are signing a behavioral contract for change. You will be more likely to adhere to your program if others know you are committed to change.

Mindfulness

The simple act of being aware of thoughts and choices is a powerful tool. A person should not feel that having an urge means that they have to act on it. A common technique of mindfulness is referred to as *urge surfing,* which directs the person to notice the urge, pay attention to the way the urge feels as it builds, and then simply continue noticing it as the urge subsides.

Behavior Analysis

How you determine the frequency, circumstances, and consequences of the behavior to be altered or implemented is known as behavior analysis. If the desired outcome is to consume less trans and saturated fats, you first must find out what foods in your diet are high in these fats, when you eat them, and when you don't eat them—all part of the preparation stage. Knowing when you don't eat them points to circumstances under which you exert control over your diet, which will help as you set goals.

Goals

Goals motivate change in behavior. The stronger the goal or desire, the more motivated you'll be either to change unwanted behaviors or to implement new, healthy behaviors. The discussion on goal setting (page 25) will help you write goals and prepare an action plan to achieve them. This will aid with behavior modification.

Self-Reevaluation

During the process of self-reevaluation, individuals analyze their feelings about a problem behavior. The pros and cons or advantages and disadvantages of a certain behavior can be reevaluated at this time. For example, you may decide that strength training will help you get stronger and tone up, but implementing this change will require you to wake up earlier three times per week. If you remember a time when you enjoyed feeling fit and capable of meeting daily physical demands with ease, you may feel good about weight loss and enhanced physical capacity as a result of a strength-training program. Pair your desired behavior with positive feelings to create a positive affect (immediate associations and feelings) when you visualize your goal.

Countering

The process whereby you substitute healthy behaviors for a problem behavior, known as countering, is a critical part of the action and maintenance stages of changing behaviors. You need to replace unhealthy behaviors with new, healthy ones. For example you may use exercise, volunteer work, or reading to prevent overeating and achieve recommended body weight.

Monitoring

During the action and maintenance stages, continuous behavior monitoring increases awareness of the desired outcome. Sometimes, this process of monitoring is sufficient in itself to cause change. For example, keeping track of daily food intake reveals sources of excessive fat in the diet. This can help you gradually cut down on or completely eliminate high-fat foods. If the goal is to increase daily intake of fruits and vegetables, keeping track of the number of servings consumed each day raises awareness and may help increase intake.

Environment Control

In environment control, the person restructures the physical surroundings to avoid problem behaviors and decrease temptations. If you bring baby carrots and nuts to work instead of chips, you are likely to snack better.

Helping Relationships

Surround yourself with people who will work toward a common goal with you or those who care about you and will encourage you along the way. "Helping relationships" will be supportive during the action, maintenance, and termination/adoption stages.

Attempting to quit smoking, for instance, is easier when a person is around others who have already quit or are trying to quit as well. One particular research study examined a large social network of people to understand the smoking habits of individuals who personally knew someone who had quit. They found that knowing someone who had quit smoking boosted an individual's likelihood to quit or avoid starting in the first place. People were much less likely to be a smoker than the national average if the person who had quit was their spouse, a friend, or a sibling.[8] Researchers found that, consistently, it was the closeness of the relationship, and not geographical closeness, that made the difference in health behaviors.

In some cases, people who have achieved the same goal already may not be supportive. For instance, someone may say, "I can do six consecutive miles." Your response should be, "I'm proud that I can jog three consecutive miles."

Rewards

People tend to repeat behaviors that are rewarded and to disregard those that are not rewarded or are punished. Rewarding oneself or being rewarded by others is a powerful tool during the process of change in all stages. Rewards are important and should not be skipped. If you have successfully cut down your caloric intake during the week, reward yourself by going to a movie or buying a new pair of shoes. Do not reinforce yourself with destructive behaviors such as eating a calorie-dense dinner. If you fail to change a desired behavior (or to implement a new one), you may want to put off buying those new shoes you had planned for that week. When a positive behavior becomes habitual, give yourself an even better reward. Treat yourself to a weekend away from home or buy a new bicycle.

2.7 SMART Goals

Only a well-conceived action plan will help you attain goals. Determining what you want to accomplish is the starting point, but to reach your goal you need to write **SMART** goals. The SMART acronym means that goals are *S*pecific, *M*easurable, *A*cceptable, *R*ealistic, and *T*ime-specific:

1. *Specific.* When writing goals, state in a positive manner exactly what you would like to accomplish. For example, if you are overweight at 150 pounds and at 27 percent body fat, simply stating "I will lose weight" is not a specific goal. Instead, rewrite your goal to state, "I will reduce my body fat to 20 percent (137 pounds) in 12 weeks."

   Be sure to write down your goals. An unwritten goal is simply a wish. A written goal, in essence, becomes a contract with yourself. Show this goal to a friend or an instructor and have him or her witness the contract you made with yourself by signing alongside your signature.

   Once you have identified and written down a specific goal, write the specific **actions** that will help you reach that goal. These actions are the necessary steps required to reach your goal.
2. *Measurable.* Whenever possible, goals and actions should be measurable. For example, "I will lose weight" is not measurable, but "I will reduce body fat to 20 percent" is measurable. Small, measureable milestones offer opportunities for successes along the journey towards a goal. The body's natural response to achieving a goal is to release positive neurotransmitters. These natural reinforcements increase a person's likelihood of associating future goals with positive emotions.
3. *Acceptable.* Goals that you set for yourself are more motivational than goals that someone else sets for you. These goals will motivate and challenge you and should be consistent with other goals that you have. As you set an acceptable goal, ask yourself: Do I have the time, commitment, and necessary skills to accomplish this goal? If not, you need to restate your goal so that it is acceptable to you.

   In instances where successful completion of a goal involves others, such as an athletic team or an organization, an acceptable goal must be compatible with those of the other people involved. If a team's practice schedule is set Monday through Friday from 4:00 p.m. to 6:00 p.m., it is unacceptable for you to train only three times per week or at a different time of the day.
4. *Realistic.* Goals should be within reach. If you currently weigh 190 pounds and your target weight (at 20 percent body fat) is 140 pounds, setting a goal to lose 50 pounds in a month would be unsound, if not impossible. Such a goal does not allow for the implementation of adequate behavior modification techniques or ensure weight maintenance at the target weight. Unattainable goals only set you up for failure, discouragement, and loss of interest.

   On the other hand, do not write goals that are too easy to achieve and that do not challenge you. If a goal is too easy, you may lose interest and stop working toward it.

   At times, problems arise even with realistic goals. Try to anticipate potential difficulties as much as possible and plan for ways to deal with them. If your goal is to jog for 30 minutes on 6 consecutive days, what are the alternatives if the weather turns bad? Possible solutions are to jog in the rain, find an indoor track, jog at a different time of day when the weather is better, or participate in a different aerobic activity such as stationary cycling, swimming, or step aerobics.

   Monitoring your progress as you move toward a goal also reinforces behavior. Keeping an exercise log or doing a body composition assessment periodically enables you to determine your progress at any given time.
5. *Time-specific.* A goal always should have a specific date set for completion. The above example to reach 20 percent body fat in 12 weeks is time-specific. The chosen date should be realistic but not too distant in the future. Allow yourself enough time to achieve the goal, but not too much time, as this could affect your performance. With a deadline, a task is much easier to work toward.

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Social support enhances regular participation and the process of behavior modification.

Goal Evaluation

In addition to the SMART guidelines already provided, you should conduct periodic evaluations of your goals. Reevaluations are vital for success. You may find that after you have fully committed and put all your effort into a goal, that goal may be unreachable. If so, reassess the goal.

Recognize that you will face obstacles and that you will not always meet your goals. Use your setbacks and learn from them. Rewrite your goal and create a plan that will help you get around self-defeating behaviors in the future. Once you achieve a goal, set a new one to improve upon or maintain what you have achieved. Goals keep you motivated.

In addition to previously discussed guidelines, throughout this book you will find information on behavioral change. For example, Chapter 4 includes the Exercise Readiness Questionnaire, tips to start and adhere to an exercise program, how to set your fitness goals, and tips to enhance your aerobic workout; Chapter 7 gives suggestions on how to adhere to a lifetime weight management program; Chapter 8 sets forth stress management techniques; and Chapter 9 outlines a six-step smoking cessation plan.

GLOSSARY

SMART An acronym for Specific, Measurable, Acceptable, Realistic, and Time-specific goals.

Actions Steps required to reach a goal.

Assess Your Behavior

1. Do you set goals that are meaningful and rewarding to you?
2. During times of stress, do you have a healthy habit you can fall back on?
3. Do you make time to reward yourself in healthy ways for achiving a goal?
4. Do you embrace setbacks as learning experiences?

Assess Your Knowledge

1. Habits develop
   a. in familiar environments.
   b. during times of low stress.
   c. in the executive portion of the brain.
   d. when a person is paying careful attention to his/her own actions.
   e. after a behavior is repeated one or two times.
2. The executive portion of the brain
   a. puts the breaks on impulsive behavior.
   b. is responsible for remembering long-term goals.
   c. is responsible for social behavior.
   d. is the area of the brain where complex thought processing takes place.
   e. All of the above choices are correct.
3. People with an internal locus of control
   a. believe they are victims of their surroundings.
   b. are less likely to achieve a goal than people with an external locus of control.
   c. are encouraged to develop an external locus of control.
   d. are healthier.
   e. have a difficult time initiating a wellness program.
4. Social liberation
   a. is detrimental to goal setting because there is no accountability for one's actions.
   b. is achieved when a person permanently adopts a new behavior.
   c. involves cues that a certain behavior will be accepted and supported in a person's community.
   d. All of the above are true.
   e. None of the above are true.
5. The process whereby you substitute healthy behaviors for a problem behavior is called
   a. monitoring.
   b. mindfulness.
   c. countering.
   d. replacement.
   e. implementation.
6. Visualizing a plan for when you are tempted to give up on your goal is known as
   a. the obstacle approach.
   b. implementation intentions.
   c. cognitive hurdlers.
   d. the growth-mindset strategy.
   e. willpower reserve.
7. Which of the following impediments can keep people from acting on a desire to change?
   a. internal locus of control and a fixed mindset
   b. lack of competence, confidence, and motivation
   c. precontemplation and termination
   d. unaccustomed environments and time-specific deadlines
   e. emotional arousal, countering, and monitoring
8. Which of the following is a stage in the behavioral modification model?
   a. recognition
   b. motivation
   c. relapse
   d. preparation
   e. goal setting
9. A precontemplator is a person who
   a. has no desire to change a behavior.
   b. is looking to make a change in the next 6 months.
   c. is preparing for change in the next 30 days.
   d. willingly adopts healthy behaviors.
   e. is talking to a therapist to overcome a problem behavior.
10. A SMART goal is effective when it is
    a. realistic.
    b. measurable.
    c. specific.
    d. acceptable.
    e. All are correct choices.

Correct answers can be found on page 270.

Activity 2.1 Behavior Modification: Stages of Change

Name _____ **Date** _____

Course _____ **Section** _____

Instructions

Please indicate which response most accurately describes your stage of change for three different behaviors (in the blank space identify the behavior: smoking, physical activity, stress, nutrition, weight control, etc.). Next, select the statement (select only one) that best represents your current behavior pattern. To select the most appropriate statement, fill in the blank for one of the first three statements if your current behavior is a problem behavior. (For example, you might say, "I currrently smoke and I do *not* intend to change in the foreseeable future," or "I currently *do not* exercise, but I am contemplating changing in the next 6 months.")

If you have already started to make changes, fill in the blank in one of the last three statements. (In this case, you might say: "I currently eat a diet high in fruits, vegetables, and grains, but I have done so only within the last 6 months," or "I currently *practice adequate stress management techniques* and I have done so for more than 6 months.") You may use this technique to identify your stage of change for any type of health-related behavior.

Now write SMART goals (see page 25) and identify three processes of change (pages 22–24) that will help you achieve your goal.

Behavior 1: _____

1. I currently _____, and I do not intend to change in the foreseeable future.
2. I currently _____, but I am contemplating changing in the next 6 months.
3. I currently _____ regularly but intend to change in the next month.
4. I currently _____, but I have done so only within the last 6 months.
5. I currently _____, and I have done so for more than 6 months.
6. I currently _____, and I have done so for more than 5 years.

Stage of change: (see Stages of Change list below) _____

Specific goal and date to be accomplished: _____

Process of change to be used: _____

Behavior 2: _____

1. I currently _____, and I do not intend to change in the foreseeable future.
2. I currently _____, but I am contemplating changing in the next 6 months.
3. I currently _____ regularly but intend to change in the next month.
4. I currently _____, but I have done so only within the last 6 months.
5. I currently _____, and I have done so for more than 6 months.
6. I currently _____, and I have done so for more than 5 years.

Stage of change: (see Stages of Change list below) _____

Specific goal and date to be accomplished: _____

Process of change to be used: _____

Behavior Modification: Stages of Change (continued)

Behavior 3: _____

1. I currently _____, and I do not intend to change in the foreseeable future.
2. I currently _____, but I am contemplating changing in the next 6 months.
3. I currently _____ regularly, but I intend to change in the next month.
4. I currently _____, but I have done so only within the last 6 months.
5. I currently _____, and I have done so for more than 6 months.
6. I currently _____, and I have done so for more than 5 years.

Stage of change: (see Stages of Change list below) _____

Specific goal and date to be accomplished: _____

Process of change to be used: _____

Stages of Change

1 = Precontemplation	4 = Action
2 = Contemplation	5 = Maintenance
3 = Preparation	6 = Termination/Adoption

Self-Reflection

In your own words, indicate barriers (what may keep you from changing) that you might encounter during the process of change and how can you best prepare to overcome these barriers.

3

"The assessment of physical fitness helps to determine your present fitness levels, serves as a starting point and provides an incentive to exercise, and allows you to evaluate progress and monitor changes throughout the years."

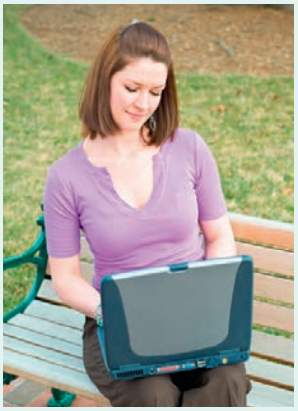
Assessment of Physical Fitness

OBJECTIVES

- 3.1 **Identify** the health-related components of physical fitness.
- 3.2 **Assess** cardiorespiratory fitness.
- 3.3 **Understand** the difference between muscular strength and muscular endurance.
- 3.4 **Assess** muscular strength.
- 3.5 **Assess** muscular flexibility.
- 3.6 **Understand** the components of body composition.
- 3.7 **Assess** body composition.
- 3.8 **Determine** recommended body weight.
- 3.9 **Assess** disease risk based on body mass index (BMI), waist circumference, and waist-to-height ratio.

Real Life Story — Jamie's Fitness Test Results

I didn't exercise a whole lot when I was in high school. I took a few years off from school to work and subsequently to get married. I always watched my weight and, although not the athletic type, I felt that I was in shape. When I came back to school, I took a fitness class and the instructor required that we do all the health-related fitness tests. I couldn't run a mile-and-a-half, but it really surprised me that even for the 1-mile walk test I was only in the fair category. My strength and flexibility were fair and good, and although my BMI was in the acceptable category, my body fat was too high. The results of my fitness tests were an eye-opening experience and made sense, based on my limited exercise time the last few years. I was determined to do something and started to exercise according to what I learned in class. At the end of the term, I



Allen/Shutterstock.com

was proud of myself: My body fat was now better than the health fitness standard, and I was also able to do the mile-and-a-half test, running the entire time and scoring in the good category. I am proud of my progress, and now in my second year, I still exercise regularly at the Student Rec Center.

Daily physical activity is the miracle medication that people are looking for. It makes you look and feel younger, boosts energy, provides lifetime weight management, improves self-confidence and self-esteem, and enhances independent living, health, and quality of life. It further allows you to enjoy a longer life by decreasing the risk of many chronic conditions, including heart disease, high blood pressure, stroke, diabetes, some cancers, and osteoporosis.

3.1 The Value of Fitness Testing

The health-related components of physical fitness—cardiorespiratory endurance, muscular fitness (strength and endurance), muscular flexibility, and body composition—are the topics of this chapter, along with basic techniques frequently used to assess these components. Through these assessment

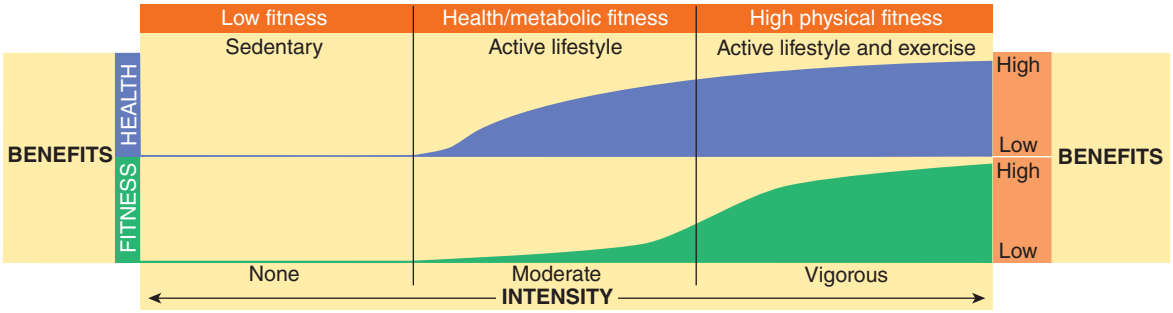
Fitness Conditioning: Responders versus Nonresponders

Individuals who follow similar training programs show a wide variation in physiological responses. Heredity plays a crucial role in how each person responds to and improves after beginning an exercise program. Several studies have documented that following exercise training, most individuals, called **responders**, readily show improvements, but a few, **nonresponders**, exhibit small or no improvements at all. This concept is referred to as the **principle of individuality**.

After several months of cardiorespiratory endurance (aerobic) training, VO_{2max} increases are between 15 percent and 20 percent, on average, although individual responses can range from 0 percent (in a few selected cases) to more than 50 percent improvement, even when all participants follow exactly the same training program. Nonfitness and low-fitness participants, however, should not label themselves as nonresponders based on the previous discussion. Nonresponders constitute less than 5 percent of exercise participants. Some research indicates that lack of improvement in cardiorespiratory endurance among nonresponders might be related to low levels of leg strength. A lower-body strength-training program has been shown to help these individuals improve VO_{2max} through aerobic exercise.[1]

Following assessment of cardiorespiratory endurance, if your fitness level is less than adequate, do not let that discourage you, but make it a priority to be physically active every day. In addition to regular exercise, lifestyle behaviors such as walking, taking stairs, cycling to work, parking farther from the office, doing household tasks, gardening, and doing yard work provide substantial benefits. In this regard, daily physical activity and exercise habits should be monitored in conjunction with fitness testing to evaluate compliance among nonresponders. After all, it is through increased daily activity that we reap the health benefits that improve quality of life.

Figure 3.1 Health and fitness benefits based on type of lifestyle and physical activity program.



techniques you will be able to determine your level of physical fitness regularly as you engage in an exercise program. Fitness testing in a comprehensive program is important to:

1. Educate yourself regarding the various fitness components.
2. Assess your fitness level for each health-related fitness component and compare the results to health fitness and physical fitness standards.
3. Identify areas of weakness for training emphasis.
4. Motivate you to participate in exercise.
5. Use as a starting point for your personalized exercise prescriptions.
6. Set realistic goals based on current fitness level.
7. Monitor progress and effectiveness of your program.
8. Make adjustments in your exercise prescription, if necessary.
9. Reward yourself for complying with your exercise program (a change to a higher fitness level is a reward in and of itself).

You are encouraged to conduct at least pre- and post-exercise program fitness tests. A personal fitness profile is provided in Activity 3.1, page 51, for you to use to record the results of each fitness test in this chapter. If you plan to repeat your fitness tests at a future date, be sure to make additional copies of this form prior to its initial use.

In Chapter 4, you will learn to write personal fitness goals for this course (see Activity 4.4, page 88). You should base these goals on the actual results of your initial fitness assessments. As you proceed with your exercise program, you should allow a minimum of eight weeks before doing your post-fitness assessments.

As discussed in Chapter 1, exercise testing or exercise participation is not advised for individuals with certain medical or physical conditions. Therefore, before starting an exercise program or participating in any exercise testing, you should fill out the Health History Questionnaire given in Chapter 1, Activity 1.1, page 14. A "yes" answer to any of the questions suggests that you consult a physician before initiating, continuing, or increasing your level of physical activity.

3.2 Fitness Assessment Battery

No single test can provide a complete measure of physical fitness. Because health-related fitness has four components, a battery of tests is necessary to determine an individual's overall level of fitness. The next few pages include descriptions of several tests used to assess the health-related fitness components. When interpreting the results of fitness tests, two standards can be applied: health fitness and physical fitness.

Health Fitness Standard

As illustrated in Figure 3.1, although fitness (VO_{2max}—see discussion of cardiorespiratory endurance on page 32) improvements with a moderate aerobic activity program are not as notable, significant health benefits are reaped with such a program. Health benefits include a reduction in blood lipids; lower blood pressure; weight loss; stress release; and lower risk for type 2 diabetes and cardiovascular disease, certain cancers, and premature mortality.

More specifically, improvements in the **metabolic profile** (better insulin sensitivity and glucose tolerance and improved cholesterol levels) can be notable despite little or no improvement in aerobic capacity or weight loss. These improvements in the metabolic profile achieved through an active lifestyle and moderate physical activity are referred to as **metabolic fitness**.

The health fitness (or criterion-referenced) standards used in this book are based on epidemiological data linking minimum fitness values to disease prevention and better health. Attaining the **health fitness standards** requires only moderate

GLOSSARY

Responders Individuals who exhibit improvements in fitness as a result of exercise training.

Nonresponders Individuals who exhibit small or no improvements in fitness as compared with others who undergo the same training program.

Principle of individuality Training concept that states that genetics plays a major role in individual responses to exercise training and that these differences must be considered when designing exercise programs for different people.

Metabolic profile Result of the assessment of diabetes and cardiovascular disease risk through plasma insulin, glucose, lipid, and lipoprotein levels.

Metabolic fitness Denotes improvements in the metabolic profile through a moderate-intensity exercise program despite little or no improvement in cardiorespiratory fitness.

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




Photos © Fitness & Wellness, Inc.

Aerobic activities promote cardiorespiratory development and help decrease the risk for chronic diseases.

amounts of physical activity. For example, a 2-mile walk in less than 30 minutes, five to six times per week, seems to be sufficient to achieve the health fitness standard for cardiorespiratory endurance.

Physical Fitness Standard

The **physical fitness standard** is set higher than the health fitness standard and requires a more vigorous exercise program. Whenever possible, participating in a vigorous exercise program is preferable because it provides even greater health and fitness benefits.[2] Such a program is recommended for individuals who wish to further improve personal fitness, reduce the risk for chronic disease and disabilities, prevent premature mortality, and prevent unhealthy weight gain.

By participating in vigorous exercise, physically fit people of all ages have the freedom to enjoy most of life's daily and recreational activities to their fullest potential. The current health fitness standards are not enough to achieve this goal.

Sound physical fitness gives the individual a level of independence throughout life that many people no longer enjoy. Most older people should be able to carry out activities similar to those they conducted in their youth, though not with the same intensity. Although a person does not have to be an elite athlete, activities such as changing a tire, chopping wood, gardening, climbing several flights of stairs, mountain biking, playing at the park with grandchildren, walking several miles around a lake, or hiking through a national park require more than the "average fitness" level of older adults in America.

Selecting Your Fitness Standard

If the main objective of the fitness program is to lower the risk for disease, attaining the health fitness standards may be adequate to ensure better health. But if the individual wants to participate in moderate-to-vigorous fitness activities and further reduce the risk for chronic disease and premature mortality, achieving a high physical fitness standard is recommended. For the purposes of this book, both health fitness and physical fitness standards are given for each fitness test. You will have to decide your personal objectives for the fitness program.

3.3 Cardiorespiratory Endurance

Cardiorespiratory endurance is the single most important component of health-related physical fitness. The one possible exception occurs among older adults, for whom muscular fitness (strength and endurance) is particularly important to better maintain **functional independence**.

Benefits of Good Cardiorespiratory (Aerobic) Endurance

Aerobic exercise is viewed by scientists and sports medicine specialists as medicine of motion. We know that aerobic exercise is one of the most effective, affordable, and readily accessible "medications" available to all. Most chronic diseases improve and can be prevented through a daily routine of aerobic exercise. The myriad of immediate and long-term health benefits starts as soon as the individual begins the first exercise session. Aerobic exercise is especially important in preventing chronic conditions, including excessive body weight and obesity, diseases of the cardiovascular system, type 2 diabetes, some forms of cancer, and physical disability.

A sound cardiorespiratory endurance program contributes greatly to good health. The typical American is not exactly a good role model in terms of cardiorespiratory fitness. A poorly conditioned heart that has to pump more often just to keep a person alive is subject to more wear and tear than a well-conditioned heart. In situations that place strenuous demands on the heart, such as doing yard work, shoveling snow, lifting heavy objects, or running to catch a bus, the unconditioned heart may not be able to sustain the strain. Regular participation in aerobic activities also helps a person achieve and maintain recommended body weight—the fourth component of health-related physical fitness.

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Maximal oxygen uptake (VO_{2max}) can be determined through direct gas analysis.

Oxygen Uptake

As a person breathes, part of the oxygen in the air is taken up in the lungs and transported in the blood to the heart. The heart then pumps the oxygenated blood through the circulatory system to all organs and tissues of the body. At the cellular level, oxygen is used to convert food substrates, primarily carbohydrates and fats, into energy (ATP, or adenosine triphosphate), necessary to conduct body functions, maintain a constant internal equilibrium, and perform physical tasks. This process is known as oxygen uptake (or VO_2).

Some examples of activities that promote **cardiorespiratory endurance**, or aerobic fitness, are brisk walking, jogging, elliptical training, cycling, spinning, rowing, swimming, cross-country skiing, aerobics, soccer, basketball, and racquetball. Guidelines to develop a lifetime cardiorespiratory endurance exercise program are given in Chapter 4, and an introduction and description of benefits of leading aerobic activities are given in Chapter 5.

Everyone who initiates a cardiorespiratory exercise program can expect a number of benefits from training. Among these are lower resting heart rate, blood pressure, low-grade body inflammation, blood lipids (cholesterol and triglycerides), recovery time following exercise, and risk for hypokinetic diseases (those associated with physical inactivity and sedentary living). Simultaneously, cardiac muscle strength, oxygen uptake, and aerobic capacity all increase.

Cardiorespiratory endurance is determined by the **maximal oxygen uptake**, or **VO_{2max}**, the maximum amount of oxygen the human body is able to utilize per minute of physical activity. The greater the oxygen uptake, the more food substrates (carbohydrates and fats) that can be converted into energy available for aerobic exercise. This value can be expressed in liters per minute (L/min) or milliliters per kilogram (2.2 pounds) of body weight per minute (mL/kg/min). One liter equals 1.06 quarts or 1,000 milliliters. The relative value in mL/kg/min is used most often because it considers total body mass (weight) in kilograms. When comparing two individuals with the same absolute value, the one with the lesser body mass will have a higher relative value, indicating that more oxygen is available to each kilogram (2.2 pounds) of body weight. Because all tissues and organs of the body need oxygen to function, higher oxygen consumption indicates a more efficient cardiorespiratory system.

Critical Thinking

While your absolute maximal oxygen uptake remains unchanged, your relative maximal oxygen uptake can increase without engaging in an aerobic exercise program.

- How can you accomplish this, and would you benefit from doing so?

Physical exertion requires more energy to perform the activity than sedentary living. As a result, the heart, lungs, and blood vessels have to deliver more oxygen to the cells to supply the required energy. During prolonged exercise, an individual with a high level of cardiorespiratory endurance is able to deliver the required amount of oxygen to the tissues with relative ease. The cardiorespiratory system of a person with a low level of endurance has to work much harder, as the heart has to pump more often to supply the same amount of oxygen to the tissues and consequently fatigues faster. Hence, a higher capacity to deliver and utilize oxygen (oxygen uptake) indicates a more efficient cardiorespiratory system.

Oxygen Uptake and Energy Expenditure

Oxygen uptake, expressed in L/min, is valuable in determining the caloric expenditure of physical activity. The human body burns about 5 calories for each liter of oxygen consumed, and oxygen uptake ranges from about 0.3 to 0.5 L/min during resting conditions to about 3 L/min during maximal exercise for moderately fit individuals and over 5 L/min in highly conditioned athletes. During aerobic exercise, the average person trains at between 50 and 75 percent of maximal oxygen uptake. Thus, we burn from 1.5 to 2.5 calories/min at rest to a range of 7 to 12 calories/min during vigorous-intensity aerobic exercise.

GLOSSARY

Physical fitness standard Required criteria to achieve a high level of physical fitness; ability to do moderate-to-vigorous physical activity without undue fatigue.

Functional independence The ability to carry out activities of daily living without assistance from other individuals.

Cardiorespiratory endurance 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.

Maximal oxygen uptake (VO_{2max}) Maximum amount of oxygen the human body is able to utilize per minute of physical activity.

Let's use a practical illustration. A person with a maximal oxygen uptake of 3.5 L/min who trains at 60 percent of maximum uses 2.1 (3.5 × 0.6) liters of oxygen per minute of physical activity. This indicates that 10.5 calories are burned during each minute of exercise (2.1 × 5). If the activity is carried out for 30 minutes, 315 calories (10.5 × 30) have been burned. Because a pound of body fat represents approximately 3,500 calories, the previous example indicates that this individual would have to exercise for a total of 333 minutes (3,500 ÷ 10.5) to burn the equivalent of about a pound of body fat. At 30 minutes per exercise session, approximately 11 sessions would be required to expend the 3,500 calories, as long as there is no greater caloric intake (caloric compensation) as a result of the exercise program.

Assessing Cardiorespiratory Endurance

Even though most cardiorespiratory endurance tests probably are safe to administer to apparently healthy individuals (those with no heart disease risk factors or symptoms), the American College of Sports Medicine recommends that physically inactive individuals with known cardiovascular, metabolic, or renal disease and/or those who have signs or symptoms indicative of these diseases should seek medical clearance before starting an exercise program, regardless of the intensity.[3]

Hoeger Key to Wellness

The benefits of increasing daily physical activity and engaging in a regular aerobic exercise program are far too impressive to be ignored.

1.5-Mile Run Test

The test used most often to determine cardiorespiratory endurance is the 1.5-mile run test. The fitness category is determined according to the time a person takes to run or walk a 1.5-mile course. The only equipment necessary to conduct this test is a stopwatch and a track or a premeasured 1.5-mile course.

Although the 1.5-mile run test is quite simple to administer, a note of caution is in order: As the objective is to cover the distance in the shortest time, it is considered a maximal exercise test. The 1.5-mile run test should be limited to conditioned individuals who have been cleared for exercise. Unconditioned beginners free of disease and signs or symptoms of disease are encouraged to have at least 6 weeks of aerobic training before they take the test.

Prior to taking the 1.5-mile run test, you should do a few warm-up exercises—some stretching exercises, some walking, and slow jogging. Next, time yourself during the 1.5-mile run to see how fast you cover the distance. If you notice any unusual symptoms during the test, do not continue. Stop immediately and see your physician, or retake the test after another six weeks of aerobic training. At the end of the test, cool down by walking or jogging slowly for another 3 to 5 minutes. Referring to your performance time, look up your estimated VO_{2max} in Table 3.1 and the corresponding fitness category in Table 3.2.

Table 3.1 Estimated Maximal Oxygen Uptake (in mL/kg/min) for 1.5-Mile Run Test

Time	VO_{2max}	Time	VO_{2max}	Time	VO_{2max}
6:10	80.0	10:30	48.6	14:50	34.0
6:20	79.0	10:40	48.0	15:00	33.6
6:30	77.9	10:50	47.4	15:10	33.1
6:40	76.7	11:00	46.6	15:20	32.7
6:50	75.5	11:10	45.8	15:30	32.2
7:00	74.0	11:20	45.1	15:40	31.8
7:10	72.6	11:30	44.4	15:50	31.4
7:20	71.3	11:40	43.7	16:00	30.9
7:30	69.9	11:50	43.2	16:10	30.5
7:40	68.3	12:00	42.0	16:20	30.2
7:50	66.8	12:10	41.7	16:30	29.8
8:00	65.2	12:20	41.0	16:40	29.5
8:10	63.9	12:30	40.4	16:50	29.1
8:20	62.5	12:40	39.8	17:00	28.9
8:30	61.2	12:50	39.2	17:10	28.5
8:40	60.2	13:00	38.6	17:20	28.3
8:50	59.1	13:10	38.1	17:30	28.0
9:00	58.1	13:20	37.8	17:40	27.7
9:10	56.9	13:30	37.2	17:50	27.4
9:20	55.9	13:40	36.8	18:00	27.1
9:30	54.7	13:50	36.3	18:10	26.8
9:40	53.5	14:00	35.9	18:20	26.6
9:50	52.3	14:10	35.5	18:30	26.3
10:00	51.1	14:20	35.1	18:40	26.0
10:10	50.4	14:30	34.7	18:50	25.7
10:20	49.5	14:40	34.3	19:00	25.4

SOURCE: Adapted from "A Means of Assessing Maximal Oxygen Intake," by K. H. Cooper, *Journal of the American Medical Association* 203 (1968): 201–204; *Health and Fitness Through Physical Activity*, by M. L. Pollock (New York: John Wiley and Sons, 1978); and *Training for Sport Activity*, by J. H. Wilmore (Boston: Allyn & Bacon, 1982).

For example, a 20-year-old female runs the 1.5-mile course in 12 minutes and 40 seconds. Table 3.1 shows a VO_{2max} of 39.8 mL/kg/min for a time of 12:40. According to Table 3.2, this VO_{2max} places her in the good cardiorespiratory fitness category.

1.0-Mile Walk Test*

The 1.0-mile walk test calls for a 440-yard track (four laps to a mile) or a premeasured 1.0-mile course. Body weight in pounds must be determined prior to the walk. A stopwatch is required to measure total walking time and exercise heart rate.

*SOURCE: Dolgener, F.A., et al. "Validation of the Rockport Fitness Walking Test in College Males and Females," *Research Quarterly for Exercise and Sport* 65 (1994): 152–158.

Table 3.2 Cardiorespiratory Fitness Category According to Maximal Oxygen Uptake (in mL/kg/min)

		Fitness Category				
Gender	Age	Poor	Fair	Average	Good	Excellent
Men	⩽29	⩽24.9	25–33.9	34–43.9	44–52.9	⩾53
	30–39	⩽22.9	23–30.9	31–41.9	42–49.9	⩾50
	40–49	⩽19.9	20–26.9	27–38.9	39–44.9	⩾45
	50–59	⩽17.9	18–24.9	25–37.9	38–42.9	⩾43
	60–69	⩽15.9	16–22.9	23–35.9	36–40.9	⩾41
Women	⩽29	⩽23.9	24–30.9	31–38.9	39–48.9	⩾49
	30–39	⩽19.9	20–27.9	28–36.9	37–44.9	⩾45
	40–49	⩽16.9	17–24.9	25–34.9	35–41.9	⩾42
	50–59	⩽14.9	15–21.9	22–33.9	34–39.9	⩾40
	60–69	⩽12.9	13–20.9	21–32.9	33–36.9	⩾37

High physical fitness standard Health fitness or criterion-referenced standard

You can proceed to walk the 1-mile course at a brisk pace so the exercise heart rate at the end of the test is above 120 beats per minute. At the end of the 1.0-mile walk, check your walking time and immediately count your pulse for 10 seconds. You can take your pulse on the wrist by placing two fingers over the radial artery (inside of the wrist on the side of the thumb) or over the carotid artery in the neck just below the jaw next to the voice box.

Next, multiply the 10-second pulse count by 6 to obtain the exercise heart rate in beats per minute. Now convert the walking time from minutes and seconds to minute units. Each minute has 60 seconds, so the seconds are divided by 60 to obtain the fraction of a minute. For instance, a walking time of 12 minutes and 15 seconds equals 12 + (15 ÷ 60), or 12.25 minutes. To obtain the estimated VO_{2max} in mL/kg/min for the 1.0-mile walk test, plug your values into the following equation:

$$VO_{2max} = 88.768 - (0.0957 \times W) + (8.892 \times G) - (1.4537 \times T) - (0.1194 \times HR)$$

where:

W = weight in pounds
G = gender (use 0 for women and 1 for men)
T = total time for the mile walk in minutes
HR = exercise heart rate in beats per minute at the end of the mile walk

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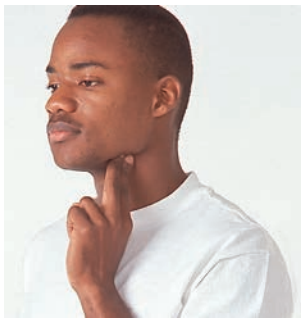
Taking the pulse at the radial artery.



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Taking the pulse at the carotid artery.

For example, a woman who weighs 140 pounds completed the mile walk in 14 minutes and 39 seconds with an exercise heart rate of 148 beats per minute. The estimated VO_{2max} is:

W = 140 lbs
G = 0 (female gender = 0)
T = 14:39 = 14 + (39 ÷ 60) = 14.65 min
HR = 148 bpm
$VO_{2max} = 88.768 - (0.0957 \times 140) + (8.892 \times 0) - (1.4537 \times 14.65) - (0.1194 \times 148)$
$VO_{2max} = 36.4$ mL/kg/min

As with the 1.5-mile run test, the fitness categories based on VO_{2max} are found in Table 3.2. Record your cardiorespiratory fitness test results on your fitness profile in Activity 3.1, page 51.

3.4 Muscular Fitness

Adequate levels of **muscular fitness** enhance a person's health and well-being throughout life. In fact, a well-planned strength-training program leads to increased muscle strength and endurance, muscle tone, tendon and ligament strength, and bone density—all of which help to improve and maintain everyday functional physical capacity.

Benefits of Good Muscular Fitness

Strength is crucial for top performance in daily activities such as sitting, walking, running, lifting and carrying objects, reaching, doing housework, and even enjoying recreational activities. Strength is also valuable in improving personal appearance and self-image, developing sports skills, promoting stability of joints, and meeting certain emergencies in life in which strength is necessary to cope effectively.

GLOSSARY

Muscular fitness A term used to define good levels of both muscular strength and muscular endurance.

Tips to Increase Daily Physical Activity

Adults need recess, too! There are 1,440 minutes in every day. Schedule a minimum of 30 of these minutes for physical activity. With a little creativity and planning, even the person with the busiest schedule can make room for physical activity. For many folks, before or after work or meals is often an available time to cycle, walk, or play. Think about your weekly or daily schedule and look for or make opportunities to be more active. Every little bit helps. Consider the following suggestions:

- Walk, cycle, jog, skate, etc., to school, work, the store, or a place of worship.
- Use a fitness tracker to count daily steps, mileage, total activity time, and estimated calories used through physical activity.
- Walk while doing errands.
- Get on or off the bus several blocks away.
- Park the car farther away from your destination.
- At work, walk to nearby offices instead of sending emails or using the phone.
- Walk or stretch a few minutes every hour that you are at your desk.
- Take fitness breaks—walking or doing desk exercises—instead of taking cigarette breaks or coffee breaks.
- Incorporate activity into your lunch break (walk to the restaurant).
- Take the stairs instead of the elevator or escalator.
- Play with children, grandchildren, or pets. Everybody wins. If you find it too difficult to be active after work, try it before work.
- Do household tasks.
- Work in the yard or garden.
- Avoid labor-saving devices. Turn off the self-propelled option on your lawnmower or vacuum cleaner.
- Use leg power. Take small trips on foot to get your body moving.
- Walk extra laps around the supermarket or mall before you start shopping.
- Exercise while watching TV (e.g., use hand weights or stationary bicycle/treadmill/stairclimber, or stretch).
- Spend more time playing sports than sitting in front of the TV or the computer.
- Dance to music. Pick some songs that inspire you to dance, then do it.
- Keep a pair of comfortable walking or running shoes in your car and office. You'll be ready for activity wherever you go!
- Make a Saturday morning walk a group habit.
- Learn a new sport or join a sports team.
- Avoid carts when golfing.
- When out of town, stay in hotels with fitness centers.
- Use positive self-talk: I can do this, I am getting fitter, I am strong, I can finish, I am getting healthier, I am managing my weight.

Try It

Keep a three-day log of all your activities. List the activities performed, time of day, and how long you were engaged in these activities. You may be surprised by your findings.

SOURCE: Adapted from Centers for Disease Control and Prevention, Atlanta, 2013.

Good strength helps to increase or maintain muscle and a higher **resting metabolic rate**; encourages weight loss and maintenance, which prevents obesity; lessens the risk for injuries and falls; reduces chronic low back pain; reduces pressure on the joints, alleviating arthritic pain; aids in childbearing; improves bone density, which prevents osteoporosis; improves cholesterol levels, decreases triglyceride levels, and reduces high blood pressure, thus reducing the risk for cardiovascular disease and premature mortality; and promotes psychological well-being. Furthermore, with time, regular strength training decreases the heart rate and blood pressure response to lifting a heavy resistance (a weight). This adaptation reduces the demands on the cardiovascular system when performing activities such as carrying a child, the groceries, or a suitcase.

Adequate strength also decreases the risk of developing physical function limitations and the overall risk of nonfatal disease. Muscular strength has been shown to be inversely associated with all-cause mortality; the lower the strength level, the higher the risk for early mortality.[4]

Good muscular fitness also seems to be the most important health-related component of physical fitness in the older-adult population. Whereas proper cardiorespiratory endurance helps maintain a healthy heart, good strength levels do more to promote independent living than any other fitness component. More than anything else, older adults want to enjoy good health and function independently. Many, however, are confined to nursing homes because they lack sufficient strength to move about and maintain proper balance. They usually cannot walk very far, and some have to be helped in and out of beds, chairs, and tubs.

A common occurrence as people age is **sarcopenia** (the loss of muscle mass), a loss of strength and function. Sarcopenia leads to mobility disability and loss of independence. Estimates indicate