Thomas D. Fahey | Paul M. Insel | Walton T. Roth | Claire E. Insel

Fit & Well

Core Concepts and Labs in Physical Fitness and Wellness

Mc Graw Hill

14e

FOURTEENTH EDITION

FIT&WELL

Core Concepts and Labs in Physical Fitness and Wellness

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Thomas D. Fahey
California State University, Chico

Paul M. Insel
Stanford University

Walton T. Roth
Stanford University

Claire E. Insel
California Institute of Human Nutrition

Mc Graw Hill

FIT & WELL

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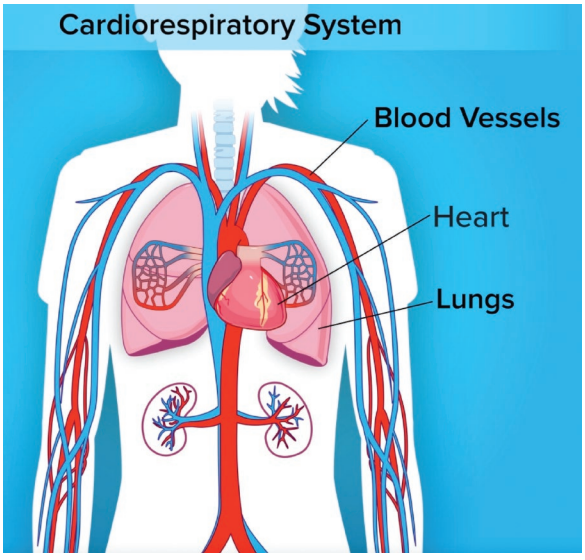
The Behavior Change Workbook and the laboratory activities are also found in an interactive format in Connect (connect.mheducation.com).

LEARN WITHOUT LIMITS

connect

McGraw-Hill Connect is a digital teaching and learning environment that improves performance over a variety of critical outcomes; it is easy to use, and it is proven effective. Connect® empowers students to achieve better outcomes by continually adapting to deliver precisely what they need, when they need it, and how they need it, so your class time is more engaging and effective. Connect for *Fit & Well* offers a wealth of interactive online content, including fitness and wellness labs and self-assessments, video activities on timely health topics and exercise techniques, a behavior change workbook, and practice quizzes with immediate feedback. The Connect eBook makes it easy for students to access their reading materials on smartphones and tablets; they can study on the go and don't need internet access to use it.

McGraw-Hill's **Application-Based Activities** are highly interactive, automatically graded, online learn-by-doing exercises that provide students the opportunity to assess their current fitness and wellness status and apply critical thinking skills to improve well-being. For this edition of *Fit & Well,* the Application-Based Activities include some of the most popular Lab Activities from the text as well as additional self-assessments. (The Lab Activities from the text also remain available in standard question bank format.)



Expanded for this edition are assignable and assessable **Concept Clips**, which help students to master key personal health concepts. Using colorful animation and easy-to-understand audio narration, Concept Clips provide step-by-step presentations to promote student comprehension. Topics include the stages of change model, diabetes types and metabolism, changes to the Nutrition Facts label, the cardiorespiratory system, exercise program planning, and the stress response.

Also expanded are **NewsFlash** activities, which tie current news stories to key fitness and wellness concepts. After interacting with a contemporary news story, students are assessed on their understanding and their ability to make the connections between real-life events and course content. Examples of NewsFlash topics include dangers of sedentary time, colon cancer screening, and low-fat versus low-carb diets.

Finally, the Dietary Analysis Tool **NutritionCalc Plus** provides a suite of powerful dietary self-assessment tools that help students track their food intake and activity and analyze their diet and health goals. Students and instructors can trust the reliability of the ESHA database while interacting with a robust selection of reports. This tool is provided at no additional charge inside Connect for *Fit & Well.*

SMARTBOOK®

Available within Connect, **SmartBook 2.0** makes study time as productive and efficient as possible by identifying and closing knowledge gaps. SmartBook identifies what an individual student knows and doesn't know based on the student's confidence level, responses to questions, and other factors. SmartBook continually adapts to an individual student's needs, creating a personalized learning experience for each student. SmartBook creates a more productive learning experience by focusing students on the concepts they need to study the most. Students spend less time on concepts they already understand and more time on those they don't. This ensures that every minute spent with SmartBook is returned to the student as the most value-added minute possible. The result? More confidence, better grades, and greater success. Find out more about the powerful personalized learning experience in SmartBook 2.0 at www.mheducation.com/highered/connect/smartbook.

New to this edition, SmartBook 2.0 is now available on all mobile smart devices. Just like the Connect eBook, SmartBook 2.0 is available in the ReadAnywhere app both online and offline. Read Anywhere includes the same functionality as the eBook offered in Connect with auto-sync across both platforms. SmartBook 2.0 was designed and developed for all students, including those learners with visual, auditory, and cognitive difficulties, or situations in which it's more convenient to read the book on a mobile device. Visit mheducation.com/ReadAnywhere to learn more.

PROVEN, SCIENCE-BASED CONTENT

The digital teaching and learning tools within Connect are built on the solid foundation of *Fit & Well*'s authoritative, science-based content. *Fit & Well* is written by experts who work and teach in the fields of exercise science, physical education, and health education. *Fit & Well* provides accurate, reliable current information on key health and fitness topics while also addressing issues related to mind-body health, diversity, research, and consumer health.

Wellness in the Digital Age sections focus on the many fitness- and wellness-related devices and applications that are appearing every day.

Diversity Matters features address the ways that our biological and cultural differences influence our health strengths, risks, and behaviors.

Evidence for Exercise sections demonstrate that physical activity and exercise recommendations are based on solid scientific evidence.

Fitness Tips and **Wellness** Tips catch students' attention and get them thinking about—and acting to improve—their fitness and wellness.

Critical Consumer boxes help students navigate the numerous and diverse set of health-related products currently available.

Hands-on lab activities give students the opportunity to assess their current level of fitness and wellness and to create their own individualized programs for improvement.

Take Charge features provide a wealth of practical advice for students on how to apply concepts from the text to their own lives.

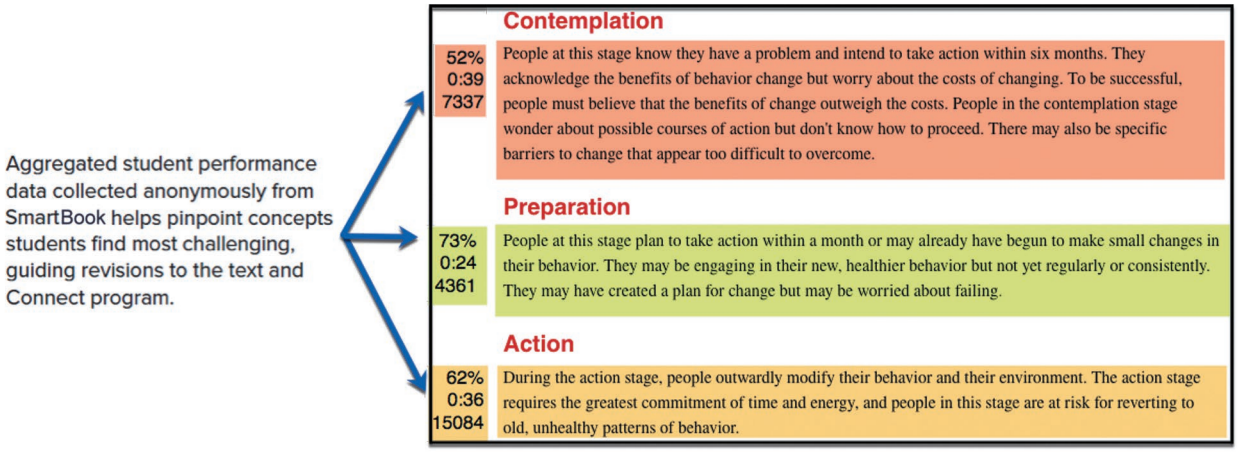
Exercise photos and online videos demonstrate how to correctly perform exercises described in the text.

Wellness in Digital Age (smartwatch): Hong Li/Getty Images; Evidence for Exercise (sneakers & stethoscope): Vstock LLC/Getty Images; Critical Consumer (businessman): sam74100/Getty Images; Take Charge (woman in red shirt): VisualCommunications/E+/Getty Images; Diversity Matters (large group): Robert Churchill/iStockphoto/Rawpixel Ltd/Getty Images; Fitness Tips (dumbbells): Fuse/GettyImages; Hands-on lab activities (tablet): Mark Dierker/McGraw-Hill; Exercise photos and online videos (squat): Photo taken by Taylor Robertson Photography

CHAPTER-BY-CHAPTER CHANGES IN *FIT & WELL*, 14TH EDITION

UPDATES INFORMED BY STUDENT DATA

Changes to the 14th edition reflect new research findings, updated statistics, and current hot topics that impact students' fitness and wellness behaviors. Revisions were also guided by student performance data collected anonymously from the tens of thousands of students who have used SmartBook with *Fit & Well.* Because virtually every text paragraph is tied to several questions that students answer while using SmartBook, the specific concepts that students are having the most difficulty with can be pinpointed through empirical data.



CHAPTER-BY-CHAPTER CHANGES

Chapter 1: Introduction to Wellness, Fitness, and Lifestyle Management

- Updated statistics on leading causes of death and the lifestyle factors that contribute to them
- Updated discussion of health insurance
- Updated review of the inverse relationship between longevity and physical activity, from the second edition of the *Physical Activity Guidelines for Americans*
- New information on *Healthy People 2030*

Chapter 2: Principles of Physical Fitness

- New and updated information on the 2018 second edition of the *Physical Activity Guidelines for Americans,* stressing the importance of regular physical activity for health and longevity and emphasizing that some physical activity is better than none
- Updated statistics and research on the role of exercise on health and longevity and on the benefits of endurance and resistance exercise for brain health and function
- Updated 2019 version of the *PAR-Q+ Physical Activity Readiness Questionnaire for Everyone* in Lab 2.1

Chapter 3: Cardiorespiratory Endurance

- New and updated information on the immediate and long-term effects of endurance exercise and on the role of endurance exercise in reducing risk for cancers of the colon, breast, bladder, endometrium, esophagus, lung, kidney, and stomach
- Clarification of the importance of endurance exercise for older adults
- Updated information on how resistance exercise stresses blood vessels and training techniques to reduce or eliminate related problems

Chapter 4: Muscular Strength and Endurance

- New Common Questions Answered focused on training at home and on muscle soreness and injury
- Updated statistics on muscular strength and power
- Updated coverage of strength training for older adults and on gender differences in strength

Chapter 5: Flexibility and Low-Back Health

- Updated statistics on the prevalence of osteoporosis and back pain
- Clarification of the importance of minimizing bedrest following the onset of acute back pain
- Updated resources and references for flexibility exercise training and preventing and treating back pain

Chapter 6: Body Composition

- Updated statistics on body composition and obesity
- New and updated information on the roles of exercise and diet in maintaining a healthy weight
- Updated resources and references for measuring body composition and preventing obesity

Chapter 7: Putting Together a Complete Fitness Program

- Updated information on popular exercise programming apps for smartphones
- Updated information on exercise program design for special populations

Chapter 8: Nutrition

- New section entitled "Planning and Budgeting for Healthy Eating"
- New and updated information on food and supplement labels, plant-based diets, and meatless burgers
- Updated discussion about nutritional recommendations for athletes
- Streamlined discussions of AMDRs, fats, fibers, and supplements

Chapter 9: Weight Management

- New presentation of three models related to weight management: energy balance, carbohydrate-insulin, and multi-factor models
- Updated discussion of the roles of diet and exercise in avoiding weight gain, losing weight, and maintaining weight loss
- New and updated sections on factors affecting RMR and appetite, including hormones and food choices
- New Common Question Answered focus on nuts as a healthy snack

Chapter 10: Stress Management and Sleep

- Updated discussion and illustrations of the stress response and symptoms of excess stress
- New discussions of Generation Z and loneliness
- Updated sections on sleep stages and sleep apnea
- New box entitled "Sleep and Learning"

Chapter 11: Cardiovascular Health and Diabetes

- Updated statistics and information on CVD types, recommendations for treatment of elevated cholesterol, and diabetes
- Updated information on blood pressure classification
- New illustration of the process of atherosclerosis

Chapter 12: Cancer

- New box entitled "Electronic Health Records"
- Updated statistics on cancer cases and deaths
- Updated recommendations on cancer screenings and HPV vaccination

Chapter 13: Substance Use and Misuse

- Updated statistics and information on nonmedical drug use among Americans, medical marijuana, rates of binge drinking, e-cigarettes, and rates of tobacco use among different population groups
- Updated examples of addictive behaviors
- Updated discussion of the opioid epidemic, including new figure showing increase in overdoses
- New sections on menthol cigarettes and thirdhand smoke

Chapter 14: Sexually Transmitted Infections

- Updated statistics on major STIs, HIV/AIDS, HIV transmission, and use of condoms by college students
- Updated information on HIV testing and HPV vaccination
- New information about *C. trachomatis* and syphilis

Chapter 15: Environmental Health

- Updated statistics on world population growth, components of solid waste, greenhouse emissions, and water shortages
- New information on the ozone layer, environmental tobacco smoke, and recycling

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Tegrity in Connect is a tool that makes class time available 24/7 by automatically capturing every lecture. With a simple one-click start-and-stop process, you capture all computer screens and corresponding audio in a format that is easy to search, frame by frame. Students can replay any part of any class with easy-to-use, browser-based viewing on a PC, Mac, iPod, or other mobile device. Educators know that the more students can see, hear, and experience class resources, the better they learn. In fact, studies prove it. Tegrity's unique search feature helps students efficiently find what they need, when they need it, across an entire semester of class recordings. Help turn your students' study time into learning moments immediately supported by your lecture. With Tegrity, you also increase intent listening and class participation by easing students' concerns about note-taking. Using Tegrity in Connect will make it more likely you will see students' faces, not the tops of their heads.

TRUSTED SERVICE AND SUPPORT

- Connect integrates with your LMS to provide single sign-on and automatic syncing of grades. Integration with Blackboard®, D2L®, and Canvas also provides automatic syncing of the course calendar and assignment-level linking.
- Connect offers comprehensive service, support, and training throughout every phase of your implementation.
- If you're looking for some guidance on how to use Connect or want to learn tips and tricks from super users, you can find tutorials as you work. Our Digital Faculty Consultants and Student Ambassadors offer insight into how to achieve the results you want with Connect: www.mheducation.com/connect.

INSTRUCTOR RESOURCES

Instructor resources available through Connect for *Fit & Well* include a course integrator guide, test bank, image bank, and PowerPoint presentations for each chapter.

New to 14e is **Test Builder**, a cloud-based tool available within Connect that enables instructors to create tests that can be printed or administered within an LMS. Test Builder offers a modern, streamlined interface for easy content configuration that matches course needs, without requiring a download. It allows access to all test bank content from a title as well as robust filtering, scrambling, and layout options. Test Builder provides a secure interface for better protection of content and allows for just-in-time updates to flow directly into assessments.

ACKNOWLEDGMENTS

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Barbara Coleman, *Northern Michigan University*
Tanya Crawford, *Treasure Valley Community College*
Karen Dennis, *Illinois State University*
Elizabeth Edwards, *James Madison University*
Nancy Estes, *Broward College*
Melissa Ferbert, *Missouri Western State University*
Robert Hess, *Community College of Baltimore County*
Terri Fleming, *Ivy Tech Community College*
Kyle Fogle, *Illinois Valley Community College*
Terry Folen, *Mt. Hood Community College*
John Jackson, *Pellissippi State Community College*
Karla Jones, *Central Piedmont Community College*
Justin Kraft, *Missouri Western State University*
Laura Marinaro, *Salisbury University*
Caryn Martin, *Anne Arundel Community College*
Keith McKelphin, *Montgomery College*
William Miller, *Concord University*
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Marnie Vanden Noven, *Belmont University*
Denise Penzkofer, *Pellissippi State Community College*
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CHAPTER 1

Introduction to Wellness, Fitness, and Lifestyle Management

LOOKING AHEAD...

After reading this chapter, you should be able to

- Describe the dimensions of wellness.
- Identify the major health and lifestyle problems in the United States today.
- Describe the behaviors that are part of a wellness lifestyle.
- Explain the steps in creating a behavior management plan.
- Evaluate some of the available sources of wellness information.

TEST YOUR KNOWLEDGE

1. Which of the following lifestyle factors is the leading preventable cause of death for Americans?
   a. excess alcohol consumption
   b. cigarette smoking
   c. obesity
2. The terms *health* and *wellness* mean the same thing. True or false?
3. A person's genetic makeup determines whether he or she will develop certain diseases (such as breast cancer), regardless of that person's health habits. True or false?

See answers on the next page.

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The next time you ask someone, "How are you?" and you get the automatic response "Fine," be grateful. If that person had told you how he or she actually felt—physically, emotionally, mentally—you might wish you had never asked. Your friend might be one of the too many people who live most of their lives feeling no better than just all right, or so-so, or downright miserable. Some do not even know what optimal wellness is. How many people do you know who feel great most of the time? Do you?

WELLNESS: NEW HEALTH GOALS

Generations of people have viewed health simply as the absence of disease, and that view largely prevails today. The word **health** typically refers to the overall condition of a person's body or mind and to the presence or absence of illness or injury. **Wellness** expands this idea of health to include our ability to achieve optimal health and vitality—to living life to its fullest. Although we use the terms *health* and *wellness* interchangeably in this book, they differ in two important ways:

- Health—or some aspects of it—can be determined or influenced by factors beyond your control, such as your genes, age, and family history. For example, a man with a family history of prostate cancer will have a higher-than-average risk for developing prostate cancer.
- Wellness is largely determined by the decisions you make about how you live. That same man can reduce his risk of cancer by eating sensibly, exercising, and having regular screening tests. Even if he develops the disease, he may still reduce its effects and live a rich, meaningful life. This means not only caring for himself physically, but also maintaining a positive outlook, keeping up his relationships with others, challenging himself intellectually, and nurturing other aspects of his life.

Wellness, therefore, involves making conscious decisions to control **risk factors** that contribute to disease or injury. Age and family history are risk factors you cannot control. Behaviors such as exercising, eating a healthy diet, and choosing not to smoke are well within your control.

Answers (Test Your Knowledge)

1. **b.** Smoking causes about 480,000 deaths per year. Obesity is responsible for as many as 470,000 premature deaths, and alcohol is a factor in 90,000 deaths per year.
2. **False.** Although the words are used interchangeably, they have different meanings. The term *health* refers to the overall condition of the body or mind and to the presence or absence of illness or injury. The term *wellness* refers to optimal health and vitality, encompassing all the dimensions of well-being.
3. **False.** In many cases, behavior can tip the balance toward good health even when heredity or environment is a negative factor.

The Dimensions of Wellness

The concept of wellness includes nine dimensions, all of which contribute to overall wellness. These dimensions are physical, emotional, intellectual, interpersonal, cultural, spiritual, environmental, financial, and occupational. The process of achieving wellness is continuing and dynamic, involving change and growth. Each dimension affects the others. Figure 1.1 lists

PHYSICAL WELLNESS
- Eating well
- Exercising
- Avoiding harmful habits
- Practicing safer sex
- Recognizing symptoms of disease
- Getting regular checkups
- Avoiding injuries

EMOTIONAL WELLNESS
- Optimism
- Trust
- Self-esteem
- Self-acceptance
- Self-confidence
- Ability to understand and accept one's feelings
- Ability to share feelings with others

INTELLECTUAL WELLNESS
- Openness to new ideas
- Capacity to question
- Ability to think critically
- Motivation to master new skills
- Sense of humor
- Creativity
- Curiosity
- Lifelong learning

INTERPERSONAL WELLNESS
- Communication skills
- Capacity for intimacy
- Ability to establish and maintain satisfying relationships
- Ability to cultivate a support system of friends and family

CULTURAL WELLNESS
- Creating relationships with those who are different from you
- Maintaining and valuing your own cultural identity
- Avoiding stereotyping based on ethnicity, gender, religion, or sexual orientation

SPIRITUAL WELLNESS
- Capacity for love
- Compassion
- Forgiveness
- Altruism
- Joy and fulfillment
- Caring for others
- Sense of meaning and purpose
- Sense of belonging to something greater than oneself

ENVIRONMENTAL WELLNESS
- Having abundant, clean natural resources
- Maintaining sustainable development
- Recycling whenever possible
- Reducing pollution and waste

FINANCIAL WELLNESS
- Having a basic understanding of how money works
- Living within one's means
- Avoiding debt, especially for unnecessary items
- Saving for the future and for emergencies

OCCUPATIONAL WELLNESS
- Enjoying what you do
- Feeling valued by your manager
- Building satisfying relationships with coworkers
- Taking advantage of opportunities to learn and be challenged

Figure 1.1 Qualities and behaviors associated with the dimensions of wellness.

specific qualities and behaviors associated with the nine dimensions of wellness. Ignoring any dimension of wellness can have harmful effects on your life. The following sections briefly introduce the dimensions of wellness. Lab 1.1 will help you learn what wellness means to you, what your wellness strengths and weaknesses are, and where you fall in each dimension on a continuum from low to high wellness.

Physical Wellness Your physical wellness includes not just your body's overall condition and the absence of disease, but also your fitness level and your ability to care for yourself. The higher your fitness level, the higher your level of physical wellness will be. Similarly, as you take better care of your own physical needs, you ensure greater physical wellness. The decisions you make now—and the habits you develop over your lifetime—will largely determine the length and quality of your life.

Emotional Wellness Your emotional wellness reflects your ability to understand and deal with your feelings. Emotional wellness involves attending to your own thoughts and feelings, monitoring your reactions, and identifying obstacles to emotional stability. *Self-acceptance* is your personal satisfaction with yourself, which might exclude society's expectations, whereas *self-esteem* relates to the way you think others perceive you. *Self-confidence* can be a part of both acceptance and esteem. Achieving this type of wellness means finding solutions to emotional problems, with professional help if necessary.

Intellectual Wellness Those who enjoy intellectual wellness continually challenge their minds. An active mind is essential to wellness because it detects problems and finds solutions. People who enjoy intellectual wellness never stop learning. They seek out and relish new experiences and challenges.

Interpersonal Wellness Satisfying and supportive relationships are important to physical and emotional wellness. Learning good communication skills, developing the capacity for intimacy, and cultivating a supportive network are all important to interpersonal (or social) wellness. Social wellness requires participating in and contributing to your community and to society.

Cultural Wellness Cultural wellness refers to the way you interact with others who are different from you in terms of ethnicity, religion, gender, sexual orientation, age, and customs (practices). It involves creating relationships with others and suspending judgment on others' behavior until you have lived with them or "walked in their shoes." It also includes accepting, valuing, and even celebrating the different cultural ways people interact in the world. The extent to which you value your own and others' cultural identities is one measure of cultural wellness.

Spiritual Wellness To enjoy spiritual wellness is to possess a set of guiding beliefs, principles, or values that give meaning and purpose to your life, especially in difficult times. The well person uses spirituality to focus on positive aspects of life and to fend off negative feelings such as cynicism, anger, and pessimism. Organized religions help many people develop spiritual health. Religion, however, is not the only source or form of spiritual wellness. Many people find meaning and purpose in their lives on their own—through nature, art, meditation, or good works—or with their loved ones.

Wellness Tip Enhancing one dimension of wellness can have positive effects on others. For example, joining a meditation group can help you enhance your spiritual well-being, but it can also affect the emotional and interpersonal dimensions of wellness by enabling you to meet new people and develop new friendships.

Jonathan Goldberg/Alamy Stock Photo

TERMS

health The overall condition of body or mind and the presence or absence of illness or injury.

wellness Optimal health and vitality, encompassing all dimensions of well-being.

risk factor A condition that increases one's chances of disease or injury.

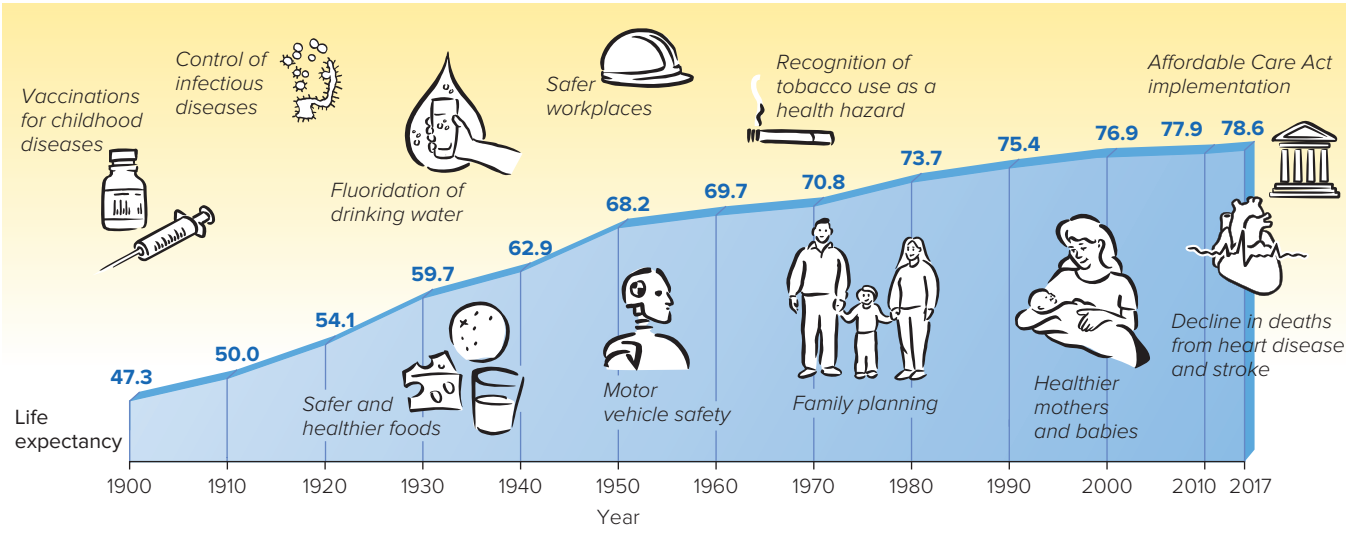


Figure 1.2 Public health and life expectancy of Americans from birth. Public health achievements during the 20th and 21st centuries are credited with adding more than 25 years to life expectancy for Americans, greatly improving quality of life, and dramatically reducing deaths from infectious diseases. Recent public health improvements include greater roadway safety, a steep decline in childhood lead poisoning, and an expansion of health insurance coverage. Still, in 2016 and 2017, U.S. life expectancy declined, especially for men. The overall decline is likely due to the opioid and obesity epidemics.

SOURCE: Murphy, S. L., et al. 2018. "Mortality in the United States, 2017." *NCHS Data Brief,* No. 328; Centers for Disease Control and Prevention. 1999. "Ten great public health achievements—United States, 1900–1999," *MMWR* 48(50): 1141.

Environmental Wellness Your environmental wellness is defined by the livability of your surroundings. Personal health depends on the health of the planet–from the safety of the food supply to the degree of violence in society. To improve your environmental wellness, you can learn about and protect yourself against hazards in your surroundings and work to make your world a cleaner, safer, and more beautiful place.

Financial Wellness Financial wellness refers to your ability to live within your means and manage your money in a way that gives you peace of mind. It includes balancing your income and expenses, staying out of debt, saving for the future, and understanding your emotions related to money. For more on this topic, see the box "Financial Wellness."

Occupational Wellness Occupational wellness refers to the level of happiness and fulfillment you gain through your work. High salaries and prestigious titles can be gratifying, but they alone do not bring about occupational wellness. Your occupational wellness depends on liking your work, feeling connected with others in the workplace, and feeling as though you're making a contribution. Another important aspect of occupational wellness is recognition from managers and colleagues.

New Opportunities for Taking Charge

In the 19th and early 20th centuries, Americans considered themselves lucky just to survive to adulthood. A boy born in 1850, for example, could expect to live only about 38 years, and a girl, 40 years. Many people died from common **infectious diseases** (such as pneumonia, tuberculosis, or diarrhea) and poor environmental conditions (such as water pollution and poor sanitation).

By 2017, however, life expectancy nearly doubled, to 78.6 years (Figure 1.2). This increase in life span is due largely to the development of vaccines and antibiotics to fight infections, and to public health measures to improve living conditions. But even though life expectancy has increased, poor health limits most Americans' activities during the last 10–15% of their lives, resulting in some form of impaired life (Figure 1.3).

Today, a different set of diseases has emerged as our major health threat: Heart disease and cancer are now the top two leading

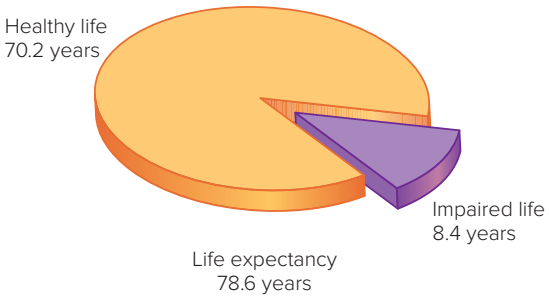


Figure 1.3 Quantity of life versus quality of life. Years of healthy life as a proportion of life expectancy in the U.S. population.

SOURCE: National Center for Health Statistics. 2016. *Healthy People 2020 Midcourse Review*, Hyattsville, MD.

TERMS

infectious disease A disease that can spread from person to person, and which is caused by microorganisms such as bacteria and viruses.

Students feel less prepared to manage their money than to handle almost any other aspect of college life, according to a 2016 study of nearly 90,000 college students. They also express distress over their current and future financial decisions. Front and center in their minds is how to manage student loan debt. Financial wellness means having a healthy relationship with money.

Follow a Budget

A budget is a way of tracking where your money goes and making sure you're spending it on the things that are most important to you. Start by listing your monthly income and your expenditures. If you aren't sure where you spend your money, track your expenses for a few weeks or a month. Then organize them into categories, such as housing, food, transportation, entertainment, services, personal care, clothes, books and school supplies, health care, loan payments, and miscellaneous. Knowing where your money goes is the first step in achieving control of it.

Be Wary of Credit Cards

Students have easy access to credit but little training in finances. The percentage of students who have access to credit cards has increased from 28% in 2012 to 63% in 2016. This increase in credit card use has also correlated with an increase in paying credit card bills late, paying only the minimum amount, and having larger total outstanding credit balances.

Shifting away from using credit cards and toward using debit cards is a good strategy for staying out of debt. Familiarity with financial terminology helps as well. Basic financial literacy with using credit cards involves understanding terms like APR (annual percentage rate—the interest you're charged on your balance), credit limit (the maximum amount you can borrow), minimum monthly payment (the smallest payment your creditor will accept each month), grace period (the number of days you have to pay your bill before interest or penalties are charged), and over-the-limit and late fees (the amounts you'll be charged if you go over your credit limit or your payment is late).

Manage Your Debt and Get Politically Active

When it comes to student loans, having a personal plan for repayment can save time and money, reduce stress, and help you prepare for the future. Student loan debt in 2014 was almost four times the amount in 2000, surpassing $1.1 trillion. However, only about 10% of students feel they have all the information needed to pay off their loans. Work with your lender and make sure you know how to access your balance, when to start repayment, how to make payments, what your repayment plan options are, and what to do if you have trouble making payments. Information on managing federal student loans is available from https://studentaid.ed.gov/sa/.

Your student debt may reflect circumstances beyond your control. For example, financial aid programs may require students to hold down jobs while also maintaining certain grade point averages. Consider contacting policymakers and asking them to pass measures to help students in need. One suggestion is for the Free Application for Federal Student Aid (FAFSA) to take into account how much debt a family or student already has when determining how much aid to grant.

Start Saving

If you start saving early, the same miracle of compound interest that locks you into years of credit card debt can work to your benefit (for an online compound interest calculator, visit http://www.interestcalc.org). Experts recommend "paying yourself first" every month—that is, putting some money into savings before you start paying your bills, depending on what your budget allows. You may want to save for a large purchase, or you may even be looking ahead to retirement. If you work for a company with a 401(k) retirement plan, contribute as much as you can every pay period.

Become Financially Literate

Most Americans have not received basic financial training. For this reason, the U.S. government has established the Financial Literacy and Education Commission (MyMoney.gov) to help Americans learn how to save, invest, and manage money better. Developing lifelong financial skills should begin in early adulthood, during the college years, if not earlier, as money-management experience appears to have a more direct effect on financial knowledge than does education. For example, when tested on their basic financial literacy, students who had checking accounts had higher scores than those who did not.

Panuwat Phimpha/Shutterstock

SOURCES: U.S. Financial Literacy and Education Commission, MyMoney.gov, 2013. (http://www.mymoney.gov); Xiao, J. J., N. Porto, and I. M. Mason. 2018. "Financial capability of student loan holders: Comparing college graduates, dropouts, and enrollees," *Working Paper*, University of Rhode Island (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3321898); EverFi, *Money Matters on Campus: Examining Financial Attitudes and Behaviors of Two-Year and Four-Year College Students.* (www.moneymattersoncampus.org).

VITAL STATISTICS

Table 1.1 Leading Causes of Death in the United States, 2017

RANK	CAUSE OF DEATH	NUMBER OF DEATHS	PERCENTAGE OF TOTAL DEATHS	LIFESTYLE FACTORS
1	Heart disease	647,457	23.0	D I S A O
2	Cancer	599,108	21.3	D I S A O
3	Accidents (unintentional injuries)	169,936	6.0	I S A
4	Chronic lower respiratory diseases	160,201	5.7	D I S O
5	Stroke	146,383	5.2	D I S A O
6	Alzheimer's disease	121,404	4.3	I S
7	Diabetes mellitus	83,564	3.0	D I S A O
8	Influenza and pneumonia	55,672	2.0	S A
9	Kidney disease	50,633	1.8	S A O
10	Intentional self-harm (suicide)	47,173	1.7	A
	All causes	2,813,503	100.0	

Key D Diet plays a part; I Inactive lifestyle plays a part; S Smoking plays a part; A Excessive alcohol use plays a part; O Obesity is a contributing factor

NOTE: Although not among the overall top 10 causes of death, HIV/AIDS (5,611 deaths in 2017) is a major killer. In 2017, HIV/AIDS was the ninth leading cause of death for Americans aged 25–44 years.

SOURCE: Heron, M. 2019. "Deaths: Leading causes for 2017." *National Vital Statistics Reports* (68)6. Hyattsville, MD: National Center for Health Statistics.

causes of death for Americans (Table 1.1). While life expectancy has consistently increased each decade in the United States since 1850, the rate of improvement has slowed (and as of 2015 actually dropped for the first time in decades). A recent increase in deaths from heart disease, stroke, and diabetes may be linked to the obesity epidemic that began in the late 1970s. Medical treatments may be reaching their limits in treating heart disease and in preventing other early deaths related to obesity. Moreover, people are becoming obese at earlier ages, exposing them to the adverse effects of excess body fat over a longer period of time. Obesity and poor eating habits can lead to all the major **chronic diseases**.

The good news is that people have some control over whether they develop chronic diseases. Every day people can make choices that increase or decrease their risks. These **lifestyle choices** include decisions regarding smoking, diet, exercise, sleep, and alcohol use. Table 1.2 shows the estimated number of annual deaths tied to selected underlying causes. Because the cause of death is not always clearly attributable to a single factor, these numbers are rough estimates. But they give the idea that lifestyle choices contribute to many deaths. For example, the estimated 90,000 deaths due to alcohol include deaths due directly to alcohol poisoning as well as alcohol-related deaths from liver cancer and accidents. The need to make good choices is especially true for teens and young adults. For Americans aged 15–24, for example, the leading cause of death is unintentional injuries (accidents), with the greatest number of deaths linked to car crashes (Table 1.3).

TERMS

chronic diseases A disease that develops and continues over a long period of time, such as heart disease or cancer.

lifestyle choice A conscious behavior that can increase or decrease a person's risk of disease or injury; such behaviors include decisions regarding smoking, eating a healthy diet, exercising, and using alcohol.

National Health

Wellness is a personal concern, but the U.S. government has financial and humanitarian interests in it, too. A healthy population is the nation's source of vitality, creativity, and wealth. Poor health drains the nation's resources and raises health care costs for all.

Health Insurance Options

The Affordable Care Act (ACA), also called "Obamacare," was signed into law on March 23, 2010. It has remained in effect since that time, although certain provisions have been altered. Health insurance costs will likely increase as a result.

FINDING A PLAN Under the ACA, health insurance marketplaces, also called health exchanges, facilitate the purchase of health insurance at the state level. The health exchanges provide a selection of government-regulated health care plans that students and others may choose from. Those who are below income requirements are eligible for federal help with the premiums. Many employers and universities also offer health insurance to their employees and students. Small businesses and members of certain associations may also be able to purchase insurance through membership in a professional group.

BENEFITS TO COLLEGE STUDENTS The ACA permits young adults to stay on their parents' health insurance plans until age 26—even if they are married or have access to coverage through an employer. Students not on their parents' plans who do not want to purchase insurance through their schools can do so through a health insurance marketplace.

VITAL STATISTICS

Table 1.2 Key Contributors to Death among Americans

	NUMBER OF DEATHS PER YEAR	PERCENTAGE OF TOTAL DEATHS PER YEAR
Tobacco	480,000+	17.5
Diet/activity patterns (obesity)	470,000	17.1
Microbial agents*	100,000	3.6
Alcohol consumption	90,000	3.3
Illicit drug use	70,000	2.6
Motor vehicles	39,000	1.4
Firearms	38,000	1.4
Sexual behavior**	11,000	0.4

*Microbial agents include bacterial and viral infections, such as influenza, pneumonia, and hepatitis. Infections transmitted sexually are counted in the "sexual behavior" category, including a proportion of deaths related to hepatitis, which can be transmitted both sexually and nonsexually.

**Estimated deaths linked to sexual behavior include those from cervical cancer (4,000) and sexually acquired HIV (6,000), hepatitis B (1,700), and hepatitis C (900). Because these infections can also be transmitted nonsexually, for example through needle sharing, only a proportion of the total deaths from these infections appears in this category. Averages of the rates of sexual transmission for different sexes and sexual orientations were taken as percentages of the number of total deaths.

SOURCES: Scholl, L., et al. 2019. "Drug and opioid-involved overdose deaths—United States, 2013–2017," *MMWR* 67(5152): 1419–1427; Centers for Disease Control and Prevention. 2019. *Leading Causes of Injury Deaths by Age Group Highlighting Unintentional Injury Deaths, United States*—2017 (https://www.cdc.gov/injury/images/lc-charts/leading_causes_of_death_by_age_group_unintentional_2017_1100w850h.jpg); Centers for Disease Control and Prevention. 2019. *Smoking & Tobacco Use: Fast Facts*. (https://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/index.htm); U.S. Department of Health & Human Services. 2018. *Viral Hepatitis* (https://www.cdc.gov/hepatitis); Xu, J., et al. 2018. "Deaths: Final data for 2016," *National Vital Statistics Reports* 67(5); Heron, M. 2019. "Deaths: Leading causes for 2017." *National Vital Statistics Reports* (68)6. Hyattsville, MD: National Center for Health Statistics.

VITAL STATISTICS

Table 1.3 Leading Causes of Death among Americans Aged 15–24, 2017

RANK	CAUSE OF DEATH	NUMBER OF DEATHS	PERCENTAGE OF TOTAL DEATHS
1	Unintentional injuries (accidents)	13,441	42.0
	Motor vehicle	6,697	20.9
	Poisoning*	5,030	15.7
2	Suicide	6,252	19.5
3	Homicide	4,905	15.3
4	Cancer	1,374	4.3
5	Heart disease	913	2.9
	All causes	32,025	100.0

*Poisoning deaths in this age group are primarily due to drug and alcohol overdose.

SOURCE: Centers for Disease Control and Prevention. 2019. "10 leading causes of death by age group, United States, 2017." *Web-based Injury Statistics Query and Reporting System* (www.cdc.gov/injury/wisqars).

Young, healthy people may prefer to buy a "catastrophic" health plan. Such plans tend to have low premiums but require you to pay all medical costs up to a certain amount, usually several thousand dollars. This can be risky if you select a plan that does not cover the ACA's 10 essential benefits: preventive care, outpatient care, emergency services, hospitalization, maternity care, mental health and substance use treatment, prescription drugs, rehabilitative services and devices, lab services, preventive services and chronic disease management, and pediatric care. It's recommended that everyone select a plan that covers all of these important types of care.

Students whose income is below a certain level may qualify for Medicaid. Check with your state. Individuals with nonimmigrant status, which includes worker visas and student visas, qualify for insurance coverage through the exchanges. You can browse plans and apply for coverage at HealthCare.gov.

The Healthy People Initiative The national Healthy People initiative aims to prevent disease and improve Americans' quality of life. Healthy People reports, published each decade since 1980, set national health goals based on 10-year agendas. *Healthy People 2030* is in development and proposes the eventual achievement of the following broad national health objectives:

- Eliminate preventable disease, disability, injury, and premature death.
- Achieve health equity, eliminate disparities, and improve health literacy.
- Create social, economic, and physical environments that promote good health for all.
- Promote healthy development and healthy behaviors across every stage of life.
- Engage leadership and the public to design effective health policies.

Continuing a trend set by *Healthy People 2020,* this initiative emphasizes the importance of factors that affect the health of individuals, demographic groups, or entire populations. These factors are social (including race and ethnicity, education level, or economic status) and environmental (including natural and human-made environments).

Examples of individual health-promotion goals from *Healthy People 2020,* along with estimated progress, appear in Table 1.4.

Behaviors That Contribute to Wellness

A lifestyle based on good choices and healthy behaviors maximizes quality of life. It helps people avoid disease, remain strong and fit, and maintain their physical and mental health as long as they live.

Be Physically Active The human body is designed to be active. It readily adapts to nearly any level of activity and exertion.

DIVERSITY MATTERS
Wellness Issues for Diverse Populations

We all need to exercise, eat well, manage stress, and cultivate positive relationships. Protecting ourselves from disease and injuries is important, too. But some of our differences—both as individuals and as members of groups—have important implications for wellness. These differences can be biological (determined genetically) or cultural (acquired as patterns of behavior through daily interactions with family, community, and society). Many health conditions are a function of biology and culture combined. You share patterns of influences with others; and information about groups can be useful in identifying areas that may be of concern to you and your family. Wellness-related differences among groups can be described in terms of a number of characteristics, including the following:

Sex and Gender. *Sex* represents the biological and physiological characteristics that define men, women, and intersex people. In contrast, *gender* refers to how people identify themselves and also the roles, behaviors, activities, and attributes that a given society considers appropriate. A person's gender is rooted in biology and physiology, but it is shaped by experience and environment—how society responds to individuals based on their sex. Examples of gender-related characteristics that affect wellness include the higher rates of smoking and drinking found among men and the lower earnings found among women compared with men doing similar work. Although men are more biologically likely than women to suffer from certain diseases (a sex issue), men are less likely to visit their physicians for regular exams (a gender issue). Men have higher rates of death from injuries, suicide, and homicide, whereas women are at greater risk for Alzheimer's disease and depression. Men and women also differ in body composition and certain aspects of physical performance.

Race and Ethnicity. Although the concept of race is complex, with the number of people who identify themselves as biracial or multiracial growing, it is still useful to identify and track health risks among population groups. Some diseases are concentrated in certain gene pools, the result of each racial or ethnic group's relatively distinct history. Diabetes is more prevalent among individuals of Native American or Latino heritage, for example, and African Americans have higher rates of hypertension. Racial and ethnic groups may vary in their traditional diets; their family and interpersonal relationships; their attitudes toward tobacco, alcohol, and other drugs; and their health beliefs and practices.

Income and Education. Of all the variables, inequalities in income and education are the most highly correlated to health status. Income and education are closely related, and groups with the highest poverty rates and least education have the worst health status. These Americans have higher rates of infant mortality, traumatic injury, violent death, and many diseases. They are more likely to eat poorly, be overweight, smoke, drink, and use drugs. They are exposed to more day-to-day stressors and have less access to health care services.

Disability. People with disabilities have activity limitations or need assistance due to a physical or mental impairment. About one in five people in the United States has some level of disability, and the rate is rising, especially among younger segments of the population. People with disabilities are more likely to be inactive and overweight. They report more days of depression than people without disabilities. Many also lack access to health care services.

Physical fitness is a set of physical attributes that allows the body to respond or adapt to the demands and stress of physical effort. The more we ask of our bodies, the stronger and more fit they become. When our bodies are not kept active, they deteriorate: Bones lose density, joints stiffen, muscles become weak, and cellular energy systems degenerate. To be truly well, human beings must be active.

Unfortunately, a **sedentary** lifestyle is common among Americans. According to the U.S. Department of Health and

Table 1.4 Progress toward *Healthy People* Targets

OBJECTIVE	BASELINE (% MEETING GOAL IN 2008)	MOST RECENT PROGRESS (% MEETING GOAL IN 2016–17)	TARGET (% BY 2020)
Increase proportion of people with health insurance	83.2	89.3	100.0
Reduce proportion of adults with hypertension	29.9	29.5	26.9
Reduce proportion of obese adults	33.9	38.6	30.5
Reduce proportion of adults who drank excessively in past 30 days	28.2	27.2	25.4
Increase proportion of adults who meet federal guidelines for exercise	18.2	24.3	20.1
Reduce proportion of adults who use cigarettes	20.6	14.1	12.0

SOURCE: U.S. Department of Health and Human Services. *Healthy People 2020* data search (https://www.healthypeople.gov/2020/data-search/Search-the-Data).

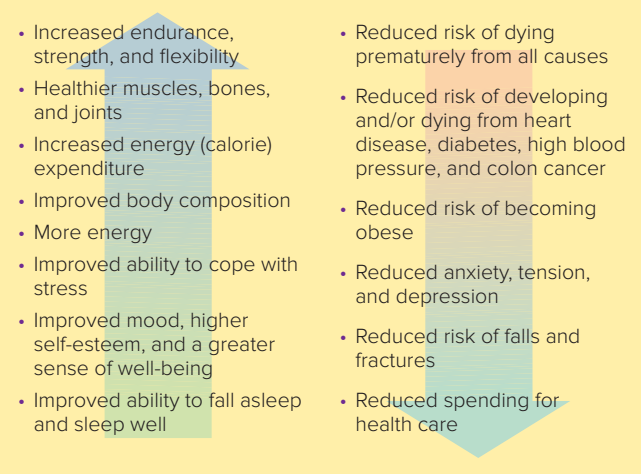


Figure 1.4 Benefits of regular physical activity.

Human Services, only 26% of men, 19% of women, and 20% of adolescents meet the federal physical activity guidelines (150 minutes or more per week of moderate aerobic exercise or 75 minutes per week of vigorous aerobic exercise). The older the adults, the less likely they are to meet the guidelines.

The benefits of physical activity are both physical and mental, immediate and long term (Figure 1.4). In the short term, being physically fit makes it easier to do everyday tasks, such as lifting; it provides reserve strength for emergencies; and it helps people look and feel good. In the long term, being physically fit confers protection against chronic diseases and lowers the risk of dying prematurely. (See the box "Does Being Physically Active Make a Difference in How Long You Live?") Physically active people are less likely to develop or die from heart disease, respiratory disease, high blood pressure, cancer, osteoporosis, and type 2 diabetes (the most common form of diabetes). As they get older, they may be able to avoid weight gain, muscle and bone loss, fatigue, and other problems associated with aging.

Choose a Healthy Diet In addition to being sedentary, many Americans have a diet that is too high in calories, unhealthy fats, and added sugars, as well as too low in fiber, complex carbohydrates, fruits, and vegetables. Like physical inactivity, this diet is linked to a number of chronic diseases. A healthy diet provides necessary nutrients and sufficient energy without also providing too much of the dietary substances linked to diseases.

Maintain a Healthy Body Weight Overweight and obesity are associated with a number of disabling and potentially fatal conditions and diseases, including heart disease, cancer, and type 2 diabetes. Researchers estimate that obesity kills between 112,000 and 500,000 Americans each year. Healthy body weight is an important part of wellness—but short-term dieting is not part of fitness or wellness. Maintaining a healthy body weight requires a lifelong commitment to regular exercise, a healthy diet, and effective stress management.

TERMS

physical fitness A set of physical attributes that allows the body to respond or adapt to the demands and stress of physical effort.

sedentary Physically inactive; literally, "sitting."

Manage Stress Effectively Many people cope with stress by eating, drinking, or smoking too much. Others don't deal with it at all. In the short term, inappropriate stress management can lead to fatigue, sleep disturbances, and other symptoms. Over longer periods of time, poor stress management can lead to less efficient functioning of the immune system and increased susceptibility to disease. Learning to incorporate effective stress management techniques into daily life is an important part of a fit and well lifestyle.

Avoid Tobacco and Drug Use and Limit Alcohol Consumption Tobacco use is associated with 9 of the top 10 causes of death in the United States; personal tobacco use and secondhand smoke kill nearly 500,000 Americans each year, more than any other behavioral or environmental factor. In 2017, 14% of adult Americans described themselves as current smokers. Lung cancer is the most common cause of cancer death among both men and women and one of the leading causes of death overall. On average, the direct health care costs associated

Wellness Tip In Table 1.1, notice how many causes of death are related to lifestyle. This is an excellent motivator for adopting healthy habits and staying in good condition. Maintaining physical fitness and a healthy diet can lead to a longer life. It's a fact!

Pablo Hidalgo/pxhidalgo/123RF

THE EVIDENCE FOR EXERCISE
Does Being Physically Active Make a Difference in How Long You Live?

How can we be sure that physical activity and exercise are good for our health? To answer this question, the U.S. Department of Health and Human Services asked a committee to review scientific literature. The committee's mission was to determine if enough evidence existed to warrant the government making physical activity recommendations to the public. The answer was yes. The committee's report, which summarized the scientific evidence for the health benefits of regular physical activity, formed the basis of the *Physical Activity Guidelines for Americans,* first released in 2008. The evidence was evaluated again in the lead-up to the release of the second edition of the guidelines in 2018.

The 2018 Physical Activity Guidelines Advisory Committee reviewed the link between moderate-to-vigorous physical activity and all-cause mortality (deaths from all causes). They looked at studies involving hundreds of thousands of people from all age groups and from different racial and ethnic groups. The data from these studies strongly support an *inverse relationship* between physical activity and all-cause mortality; that is, physically active people were less likely to die during the follow-up periods of the studies.

The review found that active people have about a 30% lower risk of dying compared with inactive people. These inverse associations were found not just for healthy adults but also for older adults (age 65 and older); for people with coronary artery disease, diabetes, or impaired mobility; and for people who were overweight or obese. Poor fitness and low physical activity levels were found to be better predictors of premature death than smoking, diabetes, or obesity. Based on the evidence, the committee determined that about 150 minutes (2.5 hours) of physical activity per week is enough to reduce all-cause mortality (see Chapter 2 for more details). It appears that it is the overall volume of energy expended, no matter which kinds of activities are done, that makes a difference in risk of premature death.

Yellowdog/Cultura/Getty Images

The committee also looked at whether there is a *dose-response* relation between physical activity and all-cause mortality—that is, whether more activity reduces death rates even further. Again, the studies showed an inverse relation between these two variables. So, more activity above and beyond 150 minutes per week produces greater benefits. Surprisingly, for inactive people, benefits are seen at levels below 150 minutes per week. In fact, *any* increase in physical activity resulted in reduced risk of death. The 2018 *Physical Activity Guidelines* refer to this as the "some is better than none" message. A target of 150 minutes per week is recommended, but any level of activity below the target is encouraged for inactive people.

Looking more closely at this relationship, the committee found that the greatest risk reduction is seen at the lower end of the physical activity spectrum (30–90 minutes per week). In fact, sedentary people who become more active have the greatest potential for improving health and reducing the risk of premature death. Additional risk reduction occurs as physical activity increases, but at a slower rate. For example, people who engaged in physical activity 90 minutes per week had a 20% reduction in mortality risk compared with inactive people, and those who were active 150 minutes per week, as noted earlier, had a 30% reduction in risk. But to achieve a 40% reduction in mortality risk, study participants had to be physically active 420 minutes per week (7 hours).

A 2018 American Heart Association report projected that cardiovascular disease costs in the United States will exceed $1.1 trillion by 2035. Regular exercise reduces the risk of cardiovascular disease and related health problems such as hypertension, high cholesterol, and diabetes. The message from the research is clear: It doesn't matter what activity you choose or even how much time you can devote to it per week, as long as you get moving!

SOURCE: Benjamin, E. J., et al. 2018. "Heart disease and stroke statistics—2018 update: A report from the American Heart Association," *Circulation* 137: e67–e492; 2015 Dietary Guidelines Advisory Committee. 2015. *Scientific Report of the 2015 Dietary Guidelines Advisory Committee.* Washington, DC: U.S. Department of Health and Human Services; 2018 Physical Activity Guidelines Advisory Committee. 2018. *2018 Physical Activity Guidelines Advisory Committee Report.* Washington, DC: U.S. Department of Health and Human Services.

with smoking exceed $170 billion per year. If the cost of lost productivity from sickness, disability, and premature death is included, the total exceeds $300 billion.

Excessive alcohol consumption is linked to 8 of the top 10 causes of death and results in about 90,000 deaths a year in the United States. The social, economic, and medical costs of alcohol abuse are estimated at more than $250 billion per year. Alcohol or drug intoxication is an especially notable factor in the death and disability of young people, particularly through unintentional injuries (such as drownings and car crashes caused by drunken driving) and violence.

Protect Yourself from Disease and Injury The most effective way of dealing with disease and injury is to prevent them. Many of the lifestyle strategies discussed here help protect you against chronic illnesses. In addition, you can take specific steps to avoid infectious diseases, particularly those that are sexually transmitted.

Take Other Steps toward Wellness Other important behaviors contribute to wellness, including these:

- *Developing meaningful relationships*—for example, learning to communicate and dealing with anger
- *Planning for successful aging*—for example, anticipating physical challenges and maintaining hobbies
- *Learning about the health care system*—for example, knowing what treatment options are available to you
- *Acting responsibly toward the environment*—for example, helping to reduce pollution and encouraging sustainable practices

Wellness Factors That Seem Outside Our Control

Heredity, the environment, and adequate health care are other important influences on health and wellness. These factors can interact in ways that raise or lower the quality of a person's life and the risk of developing particular diseases. For example, a sedentary lifestyle combined with a genetic predisposition for diabetes can greatly increase a person's risk of developing the disease. If such people also lack adequate health care, they are much more likely to suffer dangerous complications from diabetes.

But in many cases, behavior can tip the balance toward health even if heredity or environment is a negative factor. Breast cancer, for example, can run in families, but it is also associated with overweight and a sedentary lifestyle. A woman with a family history of breast cancer is less likely to die from the disease if she controls her weight, exercises, and has regular mammograms to help detect the disease in its early, most treatable stage.

College Students and Wellness

Each year, thousands of students lose productive academic time to activities causing stress and other physical and emotional health problems—some of which can continue for a lifetime. According to the Spring 2018 American College Health Association National College Health Assessment II, the following were commonly reported factors affecting academic performance:

- Stress (33.2% of students affected)
- Anxiety (26.5%)
- Sleep difficulties (21.8%)
- Depression (18.7%)
- Work (15.3%)
- Cold/flu/sore throat (16.1%)
- Concern for a troubled friend/family member (11.9%)
- Internet use/computer games (9.9%)

Each of these factors is related to one or more dimensions of wellness, and most can be influenced by choices students make daily. For example, there are many ways to manage stress: By reducing unhealthy choices, such as using alcohol to relax, and by increasing healthy choices, such as using time-management techniques, even busy students can reduce the impact of stress.

What about wellness choices in other areas? The American College Health Association survey found the following:

- Only 44.4% of sexually active students reported that they used a condom mostly or always during vaginal intercourse in the past 30 days.
- About 15.5% of students had seven or more drinks the last time they partied.
- About 11.0% of students used one or more prescription drugs that were not prescribed to them within the past year.
- About 7.5% of students smoked cigarettes, and 9.0% used e-cigarettes, at least once during the past month.

How do your daily wellness choices compare to those of other students?

Ask Yourself

QUESTIONS FOR CRITICAL THINKING AND REFLECTION

How often do you feel exuberant? Vital? Joyful? What makes you feel that way? Conversely, how often do you feel downhearted, de-energized, or depressed? What makes you feel that way? Have you ever thought about how you might increase experiences of vitality and decrease experiences of discouragement?

REACHING WELLNESS THROUGH LIFESTYLE MANAGEMENT

Moving in the direction of wellness means cultivating healthy behaviors and working to overcome unhealthy ones. This approach to lifestyle management is called **behavior change**. As you may already know from experience, changing an unhealthy habit, or a condition such as depression, can be harder than it sounds. When you embark on a behavior change plan, it may seem like too much work at first. But as you make progress, you will gain confidence in your ability to take charge of your life. You will also experience the benefits of wellness—more energy, greater vitality, deeper feelings of appreciation and curiosity, and a higher quality of life.

The rest of this chapter outlines a general process for changing unhealthy behaviors that is backed by research and has worked for many people. You will also find many specific strategies and tips for change. For additional support, work through the activities in the Behavior Change Workbook at the end of the text.

TERMS

behavior change A lifestyle management process that involves cultivating healthy behaviors and working to overcome unhealthy ones.

WELLNESS IN THE DIGITAL AGE
Quantify Yourself

You feel stressed and under the weather. How can you feel better? Do you have a habit you want to kick. Where to start?

People's increasing desire to track their moods, sleep, exercise, and diet patterns has brought about some 165,000 health-related apps and movements, like Quantified Self—a California-based company that promotes self-tracking tools among communities across the world. By giving you numerical data related to your daily behaviors, digital trackers provide objective feedback about what is going on with your health. The technology also helps you describe your behaviors to doctors and can be integrated with behavior change strategies learned through counseling. Here are three steps to making good use of technology for wellness:

1. **Monitor yourself.** How much are you smoking? Sleeping? Exercising? What are you eating? Digital trackers can help answer these questions for you. A wristband can record whether you are getting enough restful sleep. Your smartphone can tell you how many steps you took to get across campus.
2. **Analyze your data.** You've tracked your sleep, your blood pressure, and your steps. You've kept a journal related to your diet. You've taken your body measurements. What patterns do you notice? What time of day do you tend to need food? Cigarettes? Sleep? How do your patterns match up with your goals?

   Standard weight-loss apps allow users to input weight goals and monitor progress toward those goals; more sophisticated apps can analyze users' data and offer daily physical-activity goals, or help them establish a regular eating schedule. You can now find advice, education, e-mail reminders, alerts for lapses in progress, motivational messages, and journals to record and track negative emotion. Many weight-loss apps also link to social media for encouragement and social support, or rewarding games and challenges. Additional features can be critical; tracking alone isn't sufficient for successful behavior change. You need to apply change strategies such as those described later in the chapter.
3. **Extend the list of behaviors you'd like to change.** You can track more than just your diet and exercise habits with digital assistance. Electronic devices and smart programs are available to help with many aspects of wellness, including the following:

   - Stress management
   - Meditation and spirituality
   - Heart rate and respiration
   - Menstrual cycles
   - Family medical history
   - Journaling

With so many possibilities, how do you choose what to monitor? Start with one or two variables. The interactive labs at the end of each chapter focus on aspects of fitness and wellness to get you going. Also, you'll find a variety of digital devices and apps discussed in later chapters, in "Wellness in the Digital Age" boxes. You may find one or more apps (many of which are free) that appeal to you and can help you make progress toward your fitness and wellness goals.

SOURCES: IMS Institute for Healthcare Informatics. 2015. *IMS health study: Patient options expand as mobile healthcare apps address wellness and chronic disease treatment needs.* (http://www.imshealth.com/en/about-us/news/ims-health-study:-patient-options-expand-as-mobile-healthcare-apps-address-wellness-and-chronic-disease-treatment-needs); Schoeppe, S., et al. 2016. "Efficacy of interventions that use apps to improve diet, physical activity and sedentary behaviour: A systematic review," *International Journal of Behavioral Nutrition and Physical Activity* 13(127).

Getting Serious about Your Health

Before you can start changing a wellness-related behavior, you have to know that the behavior is problematic and that you *can* change it. To make good decisions, you need information about relevant topics and issues, including what resources are available to help you change.

Examine Your Current Health Habits Consider how your current lifestyle is affecting your health today. How will it affect your health in the future? Do you know which of your current habits enhance your health and which ones may be harmful? Begin your journey toward wellness with self-assessment: Think about your own behavior, complete the self-assessment in Lab 1.2, and talk with friends and family members about what they've noticed about your lifestyle and your health. Digital trackers can also help with your self-assessment; see the box "Quantify Yourself."

Choose a Target Behavior Changing any behavior can be demanding. This is why it's a good idea to start small, by choosing one behavior you want to change—called a **target behavior**—and working on it until you succeed. Your chances of success will be greater if your first goal is simple, such as resisting the urge to snack on junk food between classes. As you change one behavior, make your next goal a little more significant, and build on your success over time.

Learn about Your Target Behavior After you've chosen a target behavior, you need to learn its risks and benefits for you—both now and in the future. As a starting point, use this text and the resources listed in the For Further Exploration section at the end of each chapter;

TERMS

target behavior An isolated behavior selected as the object of a behavior change program.

CRITICAL CONSUMER

Evaluating Sources of Health Information

Surveys indicate that college students are smart about evaluating health information. They trust the health information they receive from health professionals and educators and are skeptical about popular information sources, such as magazine articles and websites.

How smart are you about evaluating health information? Here are some tips.

General Strategies

Whenever you encounter health-related information, take the following steps to make sure it is credible:

- **Go to the original source.** Media reports and social media posts often simplify the results of medical research. Find out for yourself what a study really reported, and determine whether it was based on good science. What type of study was it? Was it published in a recognized medical journal? Was it an animal study, or did it involve people? Did the study include a large number of people? What did the study's authors actually report?

- **Watch for misleading language.** Reports that tout "breakthroughs" or "dramatic proof" are probably hype. A study may state that a behavior "contributes to" or is "associated with" an outcome, but this does not prove a cause-and-effect relationship.

- **Distinguish between research reports and public health advice.** Do not change your behavior based on the results of a single report or study. If an agency such as the National Cancer Institute urges a behavior change, however, you should follow the advice. Large, publicly funded organizations issue such advice based on many studies, not a single report.

- **Remember that anecdotes are not facts.** A friend may tell you he lost weight on some new diet, but individual success stories do not mean the plan is truly safe or effective. Do any scientific studies back up the claims of the article?

- **Be skeptical.** If a report seems too good to be true, it probably is. Be wary of information contained in advertisements. An ad's goal is to sell a product, even if there is no need for it, and sometimes even if the product has not been proven to be safe or effective.

- **Make choices that are right for you.** Friends and family members can be a great source of ideas and inspiration, but you need to make health-related choices that work best for you.

Internet Resources

Online information sources pose special challenges. When reviewing a health-related website, ask these questions:

- **What is the source of the information?** Websites maintained by government agencies, professional associations, or established academic or medical institutions are likely to present trustworthy information. Many other groups and individuals post accurate information, but it is important to look at the qualifications of the people who are behind the site. (Check the home page or click the "About Us" link.) Verify information you get from social media by visiting the originating organization's website and evaluating the source.

- **How often is the site updated?** Look for sites that are updated frequently. Check the "last modified" date of any web page. Newer studies may contradict the results of earlier ones.

- **Is the site promotional?** Be wary of information from sites that sell specific products, use testimonials as evidence, appear to have a social or political agenda, or ask for money.

- **What do other sources say about a topic?** Be wary of claims and information that appear at only one site or come from a chat room, bulletin board, or blog. Do other authors cite the same studies as the ones in this article?

- **Does the site conform to any set of guidelines or criteria for quality and accuracy?** Look for sites that identify themselves as conforming to some code or set of principles, such as those set forth by the Health on the Net Foundation or the American Medical Association. Medical and health journals that have been peer reviewed (edited by experts in the field), and websites maintained by government agencies, professional associations, or established academic or medical institutions are most likely to present trustworthy information.

see the box "Evaluating Sources of Health Information" for additional guidelines. Ask these questions:

- How is your target behavior affecting your level of wellness today?
- Which diseases or conditions does this behavior place you at risk for?
- What effect would changing your behavior have on your health?

Find Help Have you identified a particularly challenging target behavior or mood—something like overuse of alcohol, binge eating, or depression—that interferes with your ability to function or places you at a serious health risk? You may need help to change behaviors or conditions that are too deeply rooted or too serious for self-management. Don't be discouraged by the seriousness or extent of the problem; many resources are available to help you solve it. On campus, the student health center or campus counseling center can provide assistance. To locate community resources, consult yellowpages.com, your physician, or the internet.

Building Motivation to Change

Knowledge is necessary for behavior change, but it isn't usually enough to make people act. Millions of people have sedentary lifestyles, for example, even though they know it's bad for their

Wellness Tip Look for behavior-change support if you need it. Certain health behaviors are exceptionally difficult to change. Some people can quit smoking on their own; others get help from a smoking cessation program or a nicotine replacement product.

baona/iStock/Getty Images

health. To succeed at behavior change, you need to be motivated and to know that even though an active lifestyle may seem difficult, it may be required.

Examine the Pros and Cons of Change Health behaviors have short-term and long-term benefits and costs. Consider the benefits and costs of an inactive lifestyle:

- *Short-term.* Such a lifestyle allows you more time to watch TV and hang out with friends, but it leaves you less fit and less able to participate in recreational activities.
- *Long-term.* This lifestyle increases the risk of heart disease, cancer, stroke, and premature death.

To successfully change your behavior, you must believe that the benefits of change outweigh the costs.

Carefully examine the pros and cons of continuing your current behavior and of changing to a healthier one. Focus on the effects that are most meaningful to you, including those tied to your personal identity and values. For example, engaging in regular physical activity and getting adequate sleep can support an image of yourself as an active person who is a good role model for others. To work toward being independent and taking control over your life, quitting smoking can be one way to eliminate a dependency. To complete your analysis, ask friends and family members about the effects of your behavior on them. For example, a younger sister may tell you that your smoking habit influenced her decision to take up smoking.

Although some people are motivated by long-term goals, such as avoiding a disease that may hit them in 30 years, most are more likely to be moved to action by shorter-term, more personal goals. Feeling better, doing better in school, improving at a sport, reducing stress, and increasing self-esteem are common, more immediate benefits of health behavior change. Many wellness behaviors are associated with immediate improvements in quality of life. For example, surveys of Americans have found that nonsmokers feel healthy and full of energy more days each month than do smokers, and they report fewer days of sadness and troubled sleep. The same is true when physically active people are compared with sedentary people. Over time, these types of differences add up to a substantially higher quality of life for people who engage in healthy behaviors.

Boost Self-Efficacy When you start thinking about changing a health behavior, a big factor in your eventual success is whether you have confidence in yourself and in your ability to change. **Self-efficacy** refers to your belief in your ability to successfully take action and perform a specific task. Strategies for boosting self-efficacy include developing an internal locus of control, using visualization and self-talk, and getting encouragement from supportive people.

LOCUS OF CONTROL Who do you believe is controlling your life? Is it your parents, friends, or school? Is it "fate"? Or is it you? **Locus of control** refers to the figurative "place" a person designates as the source of responsibility for the events in his or her life. People who believe they are in control of their own lives are said to have an *internal locus of control.* Those who believe that factors beyond their control determine the course of their lives are said to have an *external locus of control.*

For lifestyle management, an internal locus of control is an advantage because it reinforces motivation and commitment. An external locus of control can sabotage efforts to change behavior. For example, if you believe that you are destined to die of breast cancer because your mother died from the disease, you may view screening mammograms as a waste of time. In contrast, if you believe that you can take action to reduce your risk of breast cancer in spite of hereditary factors, you will be motivated to follow guidelines for early detection of the disease.

If you find yourself attributing too much influence to outside forces, gather more information about your wellness-related behaviors. List all the ways that making lifestyle changes will improve your health. If you believe you'll succeed, and if you recognize that you are in charge of your life, you're on your way to wellness.

VISUALIZATION AND SELF-TALK One of the best ways to boost your confidence and self-efficacy is to visualize yourself successfully engaging in a new, healthier behavior. Imagine yourself going for an afternoon run three days a week or no longer smoking cigarettes. Also visualize yourself enjoying all the short-term and long-term benefits that your lifestyle change will bring. Create a new self-image: What will you and your life be like when you become a regular exerciser or a nonsmoker?

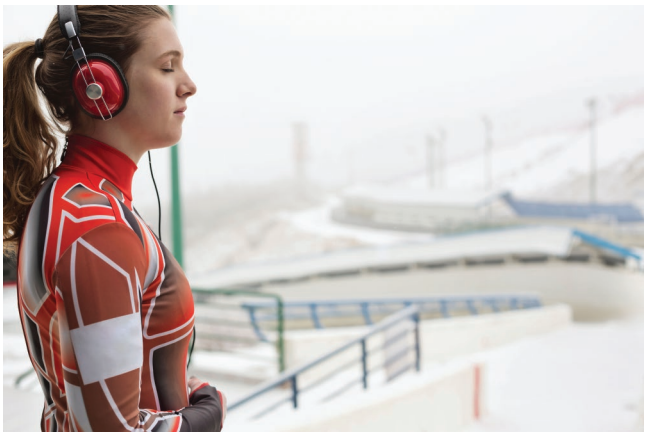
You can also use **self-talk**, the internal dialogue you carry on with yourself, to increase your confidence in your ability to

TERMS

self-efficacy The belief in one's ability to take action and perform a specific task.

locus of control The figurative "place" a person designates as the source of responsibility for the events in his or her life.

self-talk A person's internal dialogue.



Fitness Tip Visualization is such a powerful technique that Olympic athletes learn how to harness it for peak performance. It works for average people, too. Set a small fitness goal, then imagine yourself doing it—as clearly and as often as you can. Visualization can help you believe in yourself, and belief can be a step toward success!

Hero Images Inc./Alamy Stock Photo

change. Counter any self-defeating patterns of thought with more positive or realistic thoughts: "I am a strong, capable person, and I can maintain my commitment to change." See Chapter 10 for more on self-talk.

ROLE MODELS AND OTHER SUPPORTIVE INDIVIDUALS

Social support can make a big difference in your level of motivation and your chances of success. Perhaps you know people who have reached the goal you are striving for; they could be role models or mentors, providing information and support for your efforts. Gain strength from their experiences, and tell yourself, "If they can do it, so can I." In addition, find a friend who wants to make the same changes you do and who can take a helpful role in your behavior change program. For example, an exercise partner can provide companionship and encouragement when you might be tempted to skip your workout.

Identify and Overcome Barriers to Change Don't let past failures at behavior change discourage you; they can be a great source of information you can use to boost your chances of future success. Make a list of the problems and challenges you faced in any previous behavior change attempts. To this list, add the short-term costs of behavior change that you identified in your analysis of the pros and cons of change. After you've listed these key barriers to change, develop a practical plan for overcoming each one. For example, if you always smoke when you're with certain friends, decide in advance how you will turn down the next cigarette you are offered.

Enhancing Your Readiness to Change

The transtheoretical, or "stages-of-change," model is an effective approach to lifestyle self-management. According to this model, you move through distinct stages as you work to change your target behavior. It is important to determine what stage you are in now so that you can choose appropriate strategies for progressing through the cycle of change (Figure 1.5). This approach can help you enhance your readiness and intention to change.

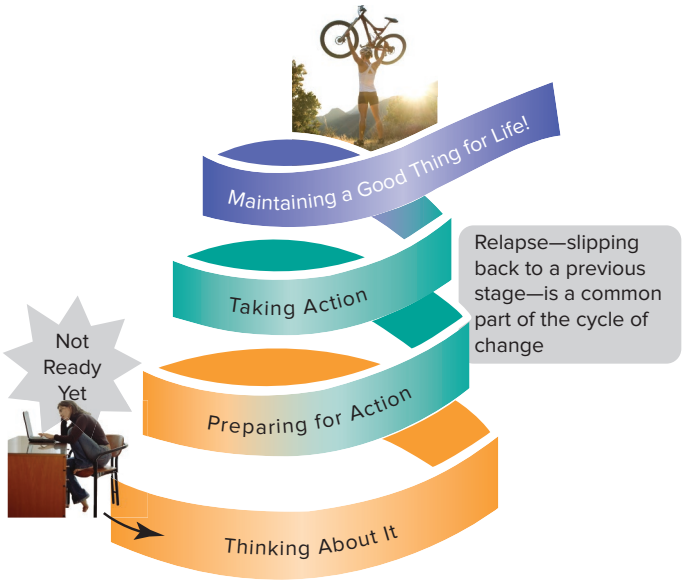


Figure 1.5 The stages of change: A spiral model.

SOURCE: Centers for Disease Control and Prevention. (n.d.). *PEP Guide: Personal Empowerment Plan for Improving Eating and Increasing Physical Activity.* Dallas, TX: The Cooper Institute.

(bike): Adam Brown/UpperCut Images/Getty Images; (desk): Ray Kachatorian/The Image Bank/Getty Images

Precontemplation People at this stage do not think they have a problem and do not intend to change their behavior. They may be unaware of the risks associated with their behavior or may deny them. They may have tried unsuccessfully to change in the past and may now think the situation is hopeless. They may also blame other people or external factors for their problems. People in the precontemplation stage believe that there are more reasons or more important reasons not to change than there are reasons to change.

Contemplation People at this stage know they have a problem and intend to take action within six months. They acknowledge the benefits of behavior change but worry about the costs of changing or specific barriers that appear too difficult to overcome. To be successful, people must believe that the benefits of change outweigh the costs. People in the contemplation stage wonder about possible courses of action but don't know how to proceed.

Preparation People at this stage plan to take action within a month or may already have begun to make small changes in their behavior. They may be engaging in their new, healthier behavior but not yet regularly or consistently. They may have created a plan for change but may be worried about failing.

TAKE CHARGE
Tips for Moving Forward in the Cycle of Behavior Change

Precontemplation

- **Raise your awareness.** Research your target behavior and its effects.
- **Be self-aware.** Look at the mechanisms you use to resist change, such as denial or rationalization. Find ways to counteract these mechanisms.
- **Seek social support.** Friends and family members can help you identify target behaviors and understand their impact on the people around you.
- **Identify helpful resources.** These might include exercise classes or stress-management workshops offered by your school.

Contemplation

- **Keep a journal.** A record of your target behavior and the circumstances that elicit the behavior can help you plan a change program.
- **Do a cost-benefit analysis.** Identify the costs and benefits (both current and future) of maintaining your behavior and of changing it. Costs can be monetary, social, emotional, and so on.
- **Identify barriers to change.** Knowing these obstacles can help you overcome them.
- **Engage your emotions.** Watch movies or read books about people with your target behavior. Imagine what your life will be like if you don't change.
- **Create a new self-image.** Imagine what you'll be like after changing your target behavior. Try to think of yourself in new terms right now.
- **Think before you act.** Learn why you engage in the target behavior. Determine what "sets you off" and train yourself not to act reflexively.

Preparation

- **Create a plan.** Include a start date, goals, rewards, and specific steps you will take to change your behavior.
- **Make change a priority.** Create and sign a contract with yourself.
- **Practice visualization and self-talk.** These techniques can help prepare you mentally for challenging situations.
- **Take short steps.** Successfully practicing your new behavior for a short time—even a single day—can boost your confidence and motivation.

Action

- **Monitor your progress.** Keep up with your journal entries.
- **Change your environment.** Make changes that will discourage the target behavior—for example, getting rid of snack foods or not stocking the refrigerator with beer.
- **Find alternatives to your target behavior.** Make a list of things you can do to replace the behavior.
- **Reward yourself.** Rewards should be identified in your change plan. Give yourself lots of praise, and focus on your success.
- **Involve your friends.** Tell them you want to change, and ask for their help.
- **Don't get discouraged.** Real change is difficult.

Maintenance

- **Keep going.** Continue using the positive strategies that worked in earlier stages.
- **Be prepared for lapses.** Don't let slip-ups set you back.
- **Be a role model.** After you have successfully changed your behavior, you may be able to help someone else do the same thing.

If relapses keep occurring or if you can't seem to control them, you may need to return to a previous stage of the behavior change process. If this is necessary, reevaluate your goals and your strategy. A different or less stressful approach may help you avoid setbacks when you try again.

Action During the action stage, people outwardly modify their behavior and their environment. Although people in this stage are at risk for reverting to old, unhealthy patterns of behavior, they may also be reaping the rewards of a positive behavior change. The action stage requires the greatest commitment of time and energy.

Maintenance People at this stage have maintained their new, healthier lifestyle for at least six months. Lapses may have occurred, but people in maintenance have been successful in quickly reestablishing the desired behavior. The maintenance stage can last for months or years.

Termination People at the termination stage have exited the cycle of change and are no longer tempted to lapse back into their old behavior. They have a new self-image and total self-efficacy with regard to their target behavior. For ideas on changing stages, see the box "Tips for Moving Forward in the Cycle of Behavior Change."

Dealing with Relapse

People seldom progress through the stages of change in a straightforward, linear way. Rather, they tend to move to a new stage and then slip back to a previous stage before resuming their

Date November 5 Day M TU W TH F SA SU

Time of day	M/S	Food eaten	Cals.	H	Where did you eat?	What else were you doing?	How did someone else influence you?	What made you want to eat what you did?	Emotions and feelings?	Thoughts and concerns?
7:30	M	1 C Crispix cereal 1/2 C skim milk coffee, black 1 C orange juice	110 40 — 120	3	home	looking at news headlines on my phone	alone	I always eat cereal in the morning	a little keyed up & worried	thinking about quiz in class today
10:30	S	1 apple	90	1	hall outside classroom	studying	alone	felt tired & wanted to wake up	tired	worried about next class
12:30	M	1 C chili 1 roll 1 pat butter 1 orange 2 oatmeal cookies 1 soda	290 120 35 60 120 150	2	campus food court	talking	eating w/ friends; we decided to eat at the food court	wanted to be part of group	excited and happy	interested in hearing everyone's plans for the weekend

M/S = Meal or snack H = Hunger rating (0–3)

Figure 1.6 Sample health journal entries.

forward progress. Research suggests that most people make several attempts before they successfully change a behavior; four out of five people experience some degree of backsliding. For this reason, the stages of change are best conceptualized as a spiral in which people cycle back through previous stages but are further along in the process each time they renew their commitment.

If you experience a *lapse*—a single slip—or a *relapse*—a return to old habits—don't give up. Relapse can be demoralizing, but it is not the same as failure. Failure means stopping before you reach your goal and never changing your target behavior. During the early stages of the change process, it's a good idea to plan for relapse so that you can avoid guilt and self-blame and get back on track quickly. Follow these steps:

1. *Forgive yourself.* A single setback isn't the end of the world.
2. *Give yourself credit for the progress you have already made.* You can use that success as motivation to continue.
3. *Move on.* You can learn from a relapse and use that knowledge to deal with potential setbacks in the future.

Developing Skills for Change: Creating a Personalized Plan

Once you are committed to making a behavior change, it's time to develop the necessary skills to make that change successful. This includes setting goals, anticipating problems, finding rewards, and taking the following steps:

1. *Monitor your behavior and gather data.* Keep a record of your target behavior and the circumstances surrounding it. Record this information for at least a week or two. Keep your notes in a health journal or on your smartphone (see the sample journal entries in Figure 1.6). Record each occurrence of your behavior, noting the following:
   - What the activity was
   - When and where it happened
   - What you were doing
   - How you felt at that time

   If your goal is to start an exercise program, track your activities to determine how to make time for workouts.
2. *Analyze the data and identify patterns.* After you have collected data on the behavior, analyze the data to identify patterns. Note the connections between your feelings and such external cues as time of day, location, situation, and actions of others around you. When are you most likely to overeat? To skip a meal? What events trigger your appetite? For example, perhaps you overindulge in food and drink when you go to a particular restaurant or when you're with certain friends.
3. *Be "SMART" about setting goals.* If your goals are too challenging, you may have trouble making steady progress and may be more likely to give up altogether. If, for example, you are in poor physical condition, it will not make sense to set a goal of being ready to run a marathon within two months. If you set goals you can live with, it will be easier to stick with your behavior change plan and be successful.

   Following the SMART criteria, your behavior change goals should be
   - *Specific.* Avoid vague goals like "eat more fruits and vegetables." Instead, state your objectives in specific terms, such as "eat two cups of fruit and three cups of vegetables every day."

- *Measurable.* Recognize that your progress will be easier to track if your goals are quantifiable, so give your goal a number. You might measure your goal in terms of time (such as "walk briskly for 20 minutes a day"), distance ("run two miles, three days per week"), or some other amount ("drink eight glasses of water every day").
- *Attainable.* Set goals that are within your physical limits. For example, if you are a poor swimmer, you might not be able to meet a short-term fitness goal by swimming laps. Walking or biking might be better options.
- *Realistic.* Manage your expectations when you set goals. For example, long-time smokers may not be able to quit cold turkey. A more realistic approach might be to use nicotine replacement patches or gum for several weeks while getting help from a support group.
- *Time frame–specific.* Give yourself a reasonable amount of time to reach your goal, state the time frame in your behavior change plan, and set your agenda to meet the goal within the given time frame.

  Using these criteria, sedentary people who want to improve their health and build fitness might set a goal of being able to run three miles in 30 minutes, to be achieved within a time frame of six months. To work toward that goal, they might set a number of smaller, intermediate goals that are easier to achieve. For example, the list of goals might look like this:

WEEK	FREQUENCY	ACTIVITY	DURATION (MINUTES)
1	3	Walk < 1 mile	10–15
2	3	Walk 1 mile	15–20
3	4	Walk 1–2 miles	20–25
4	4	Walk 2–3 miles	25–30
5–7	3–4	Walk/run 1 mile	15–20
21–24	4–5	Run 2–3 miles	25–30

You may not be able to meet these goals, but you never know until you try. As you work toward meeting your long-term goal, you may find it necessary to adjust your short-term goals. For example, you may find that you can start running sooner than you thought, or you may be able to run farther than you originally estimated. In such cases, you may want to make your goals more challenging. To stay motivated, however, some people may choose to make them easier.

For some goals and situations, it may make more sense to focus on something other than your outcome goal. If your goal involves a long-term lifestyle change, such as reaching a healthy weight, focus on developing healthy habits rather than targeting a specific weight loss. Your goal in this case might be exercising 30 minutes every day, reducing portion sizes, or eliminating late-night snacks.

4. *Devise a plan of action.* Develop a strategy that will support your efforts to change. Your plan of action should include the following steps:
   - *Get what you need.* Identify resources that can help you. For example, you can join a community walking club or sign up for a smoking cessation program. You may also need to buy some new running shoes or nicotine replacement patches. Get the items you need right away; waiting can delay your progress.
   - *Modify your environment.* If you have cues in your environment that trigger your target behavior, try to control them. For example, if you normally have alcohol at home, getting rid of it can help prevent you from indulging. If you usually study with a group of friends in an environment that allows smoking, move to a nonsmoking area. If you always buy a snack at a certain vending machine, change your route to avoid it.
   - *Control related habits.* You may have habits that contribute to your target behavior; modifying these habits can help change the behavior. For example, if you usually plop down on the sofa while watching TV, try putting an exercise bike or yoga mat in front of the TV so that you can burn calories while watching.
   - *Reward yourself.* Giving yourself instant, real rewards for good behavior will reinforce your efforts. Decide in advance what each one will be and how you will earn it. For example, you might treat yourself to a movie after a week of avoiding snacks. Make a list of items or events to use as rewards. They should be special to you and preferably unrelated to food or alcohol.
   - *Involve the people around you.* Ask family and friends to help you with your plan. To help them respond appropriately to your needs, create a specific list of dos and don'ts. For example, ask them to support you when you set aside time to exercise or when you avoid second helpings at dinner.

Wellness Tip Your environment contains powerful cues for both positive and negative lifestyle choices. The presence of parks and running/bike paths encourages physical activity, even in an urban setting. Examine your environment for cues that can support your behavior change efforts.

Monkey Business Images/Shutterstock

- *Plan for challenges.* Think about situations and people that might derail your program and develop ways to cope with them. For example, if you think it will be hard to stick to your usual exercise program during exams, schedule short bouts of physical activity (such as a brisk walk) as stress-reducing study breaks.

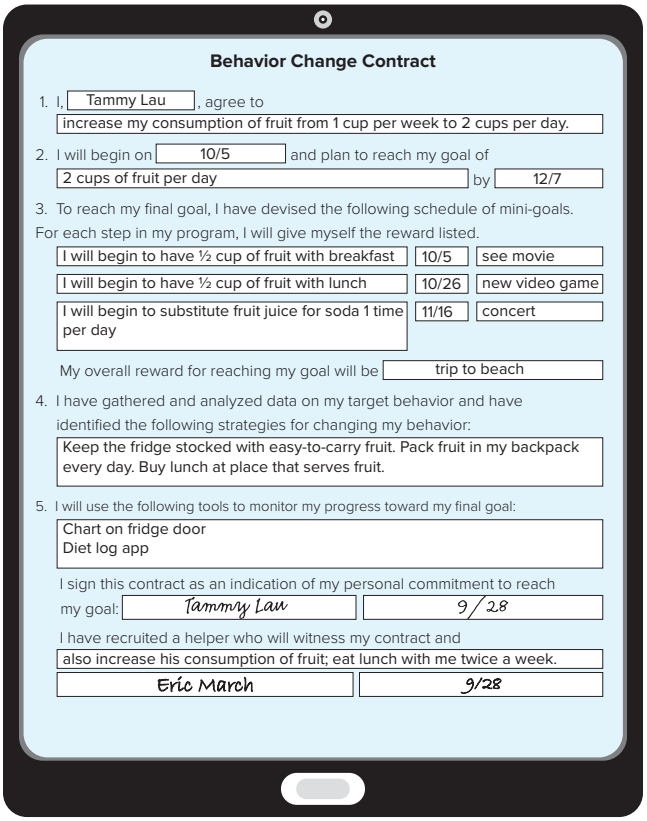
5. *Make a personal contract.* A serious personal contract—one that commits you to your word—can result in a higher chance of follow-through than a casual, offhand promise. Your contract can help prevent procrastination by specifying important dates and can also serve as a reminder of your personal commitment to change.

   Your contract should include a statement of your goal and your commitment to reaching it. The contract should also include details, such as the following:

   - The date you will start
   - The steps you will take to measure your progress
   - The strategies you plan to use to promote change
   - The date you expect to reach your final goal

   Have someone—preferably someone who will be actively helping you with your program—sign your contract as a witness.

Figure 1.7 shows a sample behavior change contract for someone committing to eating more fruit every day. A blank contract is included as Activity 8 in the Behavior Change Workbook at the end of this text.



Behavior Change Contract

1. I, Tammy Lau, agree to increase my consumption of fruit from 1 cup per week to 2 cups per day.
2. I will begin on 10/5 and plan to reach my goal of 2 cups of fruit per day by 12/7
3. To reach my final goal, I have devised the following schedule of mini-goals. For each step in my program, I will give myself the reward listed.

I will begin to have ½ cup of fruit with breakfast	10/5	see movie
I will begin to have ½ cup of fruit with lunch	10/26	new video game
I will begin to substitute fruit juice for soda 1 time per day	11/16	concert

My overall reward for reaching my goal will be trip to beach

4. I have gathered and analyzed data on my target behavior and have identified the following strategies for changing my behavior:
   Keep the fridge stocked with easy-to-carry fruit. Pack fruit in my backpack every day. Buy lunch at place that serves fruit.
5. I will use the following tools to monitor my progress toward my final goal:
   Chart on fridge door
   Diet log app

I sign this contract as an indication of my personal commitment to reach my goal: Tammy Lau 9/28

I have recruited a helper who will witness my contract and also increase his consumption of fruit; eat lunch with me twice a week.

Eric March 9/28

Figure 1.7 A sample behavior change contract.

Putting Your Plan into Action

The starting date has arrived, and you are ready to put your plan into action. This stage requires commitment, the resolve to stick with the plan no matter what temptations you encounter. Remember all the reasons you have to make the change—and remember that *you* are the boss. Use all your strategies to make your plan work. Make sure your environment is change friendly, and get as much support and encouragement from others as possible. Keep track of your progress in your health journal, and give yourself regular rewards. Most important, congratulate yourself; notice how much better you look or feel, and feel good about how far you've come and how you've gained control of your behavior.

Staying with It

As you continue with your program, don't be surprised when you run up against obstacles; they're inevitable. In fact, it's a good idea to expect problems and give yourself time to step back, see how you're doing. Feel free to make some changes before going on. If your program is grinding to a halt, identify what is blocking your progress. It may come from one of the sources described in the following sections.

Social Influences Take a hard look at the reactions of the people you're counting on, and see if they're really supporting you. If they come up short, connect with others who will be more supportive. A related trap is trying to get your friends or family members to change *their* behaviors. The decision to make a major behavior change is something people come to only after intensive self-examination. You may be able to influence someone by tactfully providing facts or support, but that's all. Focus on yourself. When you succeed, you may become a role model for others.

Levels of Motivation and Commitment You won't make real progress until an inner drive prompts you to the stage of change at which you are ready to make a personal commitment to the goal. If commitment is your problem, you may need to wait until the behavior you're dealing with makes you unhappier or unhealthier; then your desire to change it will be stronger. Or you may find that changing your goal will inspire you to keep going. For more ideas, refer to Activity 9 in the Behavior Change Workbook.

Choice of Techniques and Level of Effort If your plan is not working as well as you thought it would, make changes where you're having the most trouble. If you've lagged on your running schedule, for example, maybe it's because you don't like running. An aerobics class might suit you better. Alternatively, you may not be trying hard enough. Plan to push toward your goal. If it were easy, you wouldn't need a plan.

Stress Barrier If you hit a wall in your program, look at the sources of stress in your life. If the stress is temporary, such as catching a cold or having a term paper due, you may want to wait

until it passes before strengthening your efforts. If the stress is ongoing, find healthy ways to manage it (see Chapter 10). You may even want to make stress management your highest priority for behavior change.

Procrastinating, Rationalizing, and Blaming Be alert to games you might be playing with yourself, so you can stop them. Such games include the following:

- *Procrastinating.* If you tell yourself, "It's Friday already; I might as well wait until Monday to start," you're procrastinating. Break your plan into smaller steps that you can accomplish one day at a time.
- *Rationalizing.* If you tell yourself, "I wanted to go swimming today but wouldn't have had time to wash my hair afterward," you're making excuses.
- *Blaming.* If you tell yourself, "I couldn't exercise because Dave was hogging the elliptical trainer," you're blaming others for your own failure to follow through. Blaming is a way of taking focus off the real problem and denying responsibility for your own actions.

Being Fit and Well for Life

Your first attempts at making behavior changes may never go beyond the contemplation or preparation stage. But as you experience some success, you'll start to have more positive feelings about yourself. You may discover new physical activities and sports you enjoy, and you may encounter new situations and meet new people. Perhaps you'll surprise yourself by accomplishing things you didn't think were possible—breaking a long-standing nicotine habit, competing in a race, climbing a mountain, or developing a leaner body. Most of all, you'll discover the feeling of empowerment that comes from taking charge of your health. Being healthy takes effort, but the paybacks in energy and vitality are priceless.

Once you've started, don't stop. Assume that health improvement is forever. Take on the easier problems first, and then use what you learn to tackle more difficult problems later. When you feel challenged, remind yourself that you are creating a lifestyle that minimizes your health risks and maximizes your enjoyment of life. You can take charge of your health in a dramatic and meaningful way. *Fit & Well* will show you how.

Ask Yourself

QUESTIONS FOR CRITICAL THINKING AND REFLECTION

Think about the last time you made an unhealthy choice instead of a healthy one. How could you have changed the situation, the people in the situation, or your own thoughts, feelings, or intentions to avoid making that choice? What can you do in similar situations in the future to produce a different outcome?

TIPS FOR TODAY AND THE FUTURE

You are in charge of your health. Many of the decisions you make every day have an impact on the quality of your life, both now and in the future.

RIGHT NOW YOU CAN

- Go for a 15-minute walk.
- Have a piece of fruit for a snack.
- Call a friend and arrange for a time to catch up with each other.
- Think about whether you have a health behavior you'd like to change. If you do, consider the elements of a behavior change strategy. For example, begin a mental list of the pros and cons of the behavior, or talk to someone who can support you in your attempts to change.

IN THE FUTURE YOU CAN

- Stay current on health and wellness news and issues.
- Participate in health awareness and promotion campaigns in your community—for example, support smoking restrictions in local venues.
- Be a role model for someone else who is working on a health behavior you have successfully changed.

SUMMARY

- Wellness is the ability to live life fully, with vitality and meaning. Wellness is dynamic and multidimensional; it incorporates physical, emotional, intellectual, interpersonal, cultural, spiritual, environmental, financial, and occupational dimensions.
- As chronic diseases have emerged as major health threats in the United States, people must recognize that they have greater control over and greater responsibility for their health than ever before.
- Behaviors that promote wellness include being physically active, choosing a healthy diet, maintaining a healthy body weight, managing stress effectively, avoiding tobacco and limiting alcohol use, and protecting yourself from disease and injury.
- Although heredity, environment, and health care all play roles in wellness and disease, behavior can change their negative effects.
- The national *Healthy People 2030* initiative aims to prevent disease and improve Americans' quality of life. To achieve this goal, it proposes broad national health objectives, emphasizing the importance of health determinants—factors that affect the health of individuals, demographic groups, or entire populations.
- To make lifestyle changes, you need information about yourself, your health habits, and available resources to help you change.
- You can increase your motivation for behavior change by examining the benefits and costs of change, boosting self-efficacy, and identifying and overcoming key barriers to change.

- The stages-of-change model describes six stages that people may move through as they try to change their behavior: precontemplation, contemplation, preparation, action, maintenance, and termination.
- A specific plan for change can be developed by (1) collecting and recording data on your behavior; (2) analyzing the data; (3) setting specific goals; (4) devising strategies for modifying the environment, rewarding yourself, and involving others; and (5) making a personal contract.
- To start and maintain a behavior change program, you need commitment, a well-developed and manageable plan, social support, and stress-management techniques. You will also benefit from monitoring the progress of your program and revising it as necessary.

FOR FURTHER EXPLORATION

Centers for Disease Control and Prevention (CDC). Through phone, fax, and the internet, the CDC provides a wide variety of health information.

http://www.cdc.gov

Federal Deposit Insurance Corporation: Money Smart. A free source of information, unaffiliated with commercial interests, that includes eight modules on topics such as "borrowing basics" and "paying for college and cars."

https://www.fdic.gov/consumers/consumer/moneysmart/

Federal Trade Commission: Consumer Information: Health & Fitness. Includes online brochures about a variety of consumer health topics, including fitness equipment, generic drugs, and fraudulent health claims.

https://www.consumer.ftc.gov/health

Healthfinder. A gateway to online publications, websites, support and self-help groups, and agencies and organizations that produce reliable health information.

http://www.healthfinder.gov

Health.gov. A portal for online information from a wide variety of federal agencies.

http://health.gov

Healthy Campus. The American College Health Association's introduction to the Healthy Campus program.

http://www.acha.org/HealthyCampus

Healthy People. Provides information on Healthy People objectives and priority areas.

http://www.healthypeople.gov

MedlinePlus. Provides links to news and reliable information about health from government agencies and professional associations; also includes a health encyclopedia and information on prescription and over-the-counter drugs.

https://medlineplus.gov/

National Health Information Center (NHIC). Puts consumers in touch with the organizations that are best able to provide answers to health-related questions.

http://www.health.gov/nhic/

National Institutes of Health (NIH). Provides information about all NIH activities as well as consumer publications, hotline information, and an A-to-Z listing of health issues with links to the appropriate NIH institute.

http://www.nih.gov

National Wellness Institute. Serves professionals and organizations that promote optimal health and wellness.

http://www.nationalwellness.org

Office of Minority Health. Promotes improved health among racial and ethnic minority populations.

http://minorityhealth.hhs.gov

Office on Women's Health. Provides information and answers to frequently asked questions.

http://www.womenshealth.gov

Quantified Self. Offers a forum for people interested in tracking their diet, sleep, and other behaviors and activities using technology.

http://quantifiedself.com

Surgeon General. Includes information on activities of the Surgeon General and the text of many key reports on such topics as tobacco use, physical activity, and mental health.

http://www.surgeongeneral.gov

World Health Organization (WHO). Provides information about health topics and issues affecting people around the world.

http://www.who.int/en

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Name _____ Section _____ Date _____

LAB 1.1 Your Wellness Profile

Consider how your lifestyle, attitudes, and characteristics relate to each of the dimensions of wellness. Fill in at least three strengths for each dimension (examples of strengths are listed with each dimension). Once you've completed your lists, choose what you believe are your five most important strengths and circle them.

Physical wellness: To maintain overall physical health and engage in appropriate physical activity (e.g., stamina, strength, flexibility, healthy body composition).

_____

_____

_____

Emotional wellness: To have a positive self-concept, deal constructively with your feelings, and develop positive qualities (e.g., optimism, trust, self-confidence, determination).

_____

_____

_____

Intellectual wellness: To pursue and retain knowledge, think critically about issues, make sound decisions, identify problems, and find solutions (e.g., common sense, creativity, curiosity).

_____

_____

_____

Interpersonal/social wellness: To develop and maintain meaningful relationships with a network of friends and family members, and to contribute to your community (e.g., friendly, good-natured, compassionate, supportive, good listener).

_____

_____

_____

Cultural wellness: To accept, value, and even celebrate personal and cultural differences (e.g., refuse to stereotype based on ethnicity, gender, religion, or sexual orientation; create relationships with those who are different from you; maintain and value your own cultural identity).

_____

_____

_____

Spiritual wellness: To develop a set of beliefs, principles, or values that gives meaning or purpose to your life; to develop faith in something beyond yourself (e.g., religious faith, service to others).

_____

_____

_____

Environmental wellness: To protect yourself from environmental hazards and to minimize the negative impact of your behavior on the environment (e.g., carpooling, recycling).

_____

_____

_____

Financial wellness: To be able to live within your means and manage your money in a way that gives you peace of mind (e.g., drawing up a budget, setting up a savings account).

_____

_____

_____

Occupational wellness: To gain a measure of happiness and fulfillment through your work (e.g., enjoy what you do, feel valued by your manager, build positive relationships with coworkers, take advantage of opportunities to learn and be challenged).

_____

_____

_____

LABORATORY ACTIVITIES

Next, think about where you fall on the wellness continuum for each of the dimensions of wellness. Indicate your placement for each—physical, emotional, intellectual, interpersonal/social, cultural, spiritual, environmental, financial, and occupational—by placing Xs on the continuum below.

Based on both your current lifestyle and your goals for the future, what do you think your placement on the wellness continuum will be in 10 years? What new health behaviors will you have to adopt to achieve your goals? Which of your current behaviors will you need to change to maintain or improve your level of wellness in the future?

Does the description of wellness given in this chapter encompass everything you believe to be part of wellness for you? Write your own definition of wellness, including any additional dimensions that are important to you. Then rate your level of wellness based on your own definition.

Using Your Results

How did you score? Are you satisfied with your current level of wellness—overall and in each dimension? In which dimension(s) would you most like to increase your level of wellness?

What should you do next? As you consider possible target behaviors for a behavior change program, choose things that will maintain or increase your level of wellness in one of the dimensions you listed as an area of concern. Remember to consider health behaviors that may threaten your level of wellness in the future, such as smoking or eating a high-fat diet. List several possible target behaviors and the wellness dimensions that they influence.

Target behavior	**Wellness dimension**
1.	
2.	
3.	

For additional guidance in choosing a target behavior, complete the lifestyle self-assessment in Lab 1.2.

Name _____ Section _____ Date _____

LAB 1.2 Lifestyle Evaluation

How does your current lifestyle compare with the lifestyle recommended for wellness? For each question, choose the answer that best describes your behavior. Then add up your score for each section.

	Almost Always	Sometimes	Never
Exercise/Fitness			
1. I engage in moderate exercise, such as brisk walking or swimming, for the equivalent of at least 150 minutes per week.	4	1	0
2. I do exercises to develop muscular strength and endurance at least twice a week.	2	1	0
3. I spend some of my leisure time participating in individual, family, or team activities, such as gardening, bowling, or softball.	2	1	0
4. I maintain a healthy body weight, avoiding overweight and underweight.	2	1	0
Exercise/Fitness Score: _____			
Nutrition			
1. I eat a variety of foods each day, including seven or more servings of fruits and/or vegetables.	3	1	0
2. I limit the amount of saturated and trans fat in my diet.	3	1	0
3. I avoid skipping meals.	2	1	0
4. I limit the amount of salt and added sugars I eat.	2	1	0
Nutrition Score: _____			
Tobacco and Nicotine			
1. I avoid smoking cigarettes.	4	1	0
2. I avoid using pipes, cigars, and e-cigarettes.	2	1	0
3. I avoid spit tobacco.	2	1	0
4. I limit my exposure to environmental tobacco smoke.	2	1	0
Tobacco Use Score: _____			
Alcohol and Drugs			
1. I avoid alcohol, or I drink no more than one (women) or two (men) drinks a day.	4	1	0
2. I avoid using alcohol or other drugs as a way of handling stressful situations or the problems in my life.	2	1	0
3. I am careful not to drink alcohol when taking medications (such as cold or allergy medications) or when pregnant.	2	1	0
4. I read and follow the label directions when using prescribed and over-the-counter drugs.	2	1	0
Alcohol and Drugs Score: _____			
Emotional Health			
1. I enjoy being a student, and I have a job or do other work that I enjoy.	2	1	0
2. I find it easy to relax and express my feelings freely.	2	1	0
3. I manage stress well.	2	1	0
4. I have close friends, relatives, or others whom I can talk to about personal matters and call on for help when needed.	2	1	0
5. I participate in group activities (such as community or church organizations) or hobbies that I enjoy.	2	1	0
Emotional Health Score: _____			

LABORATORY ACTIVITIES

	Almost Always	Sometimes	Never
Safety			
1. I wear a safety belt while riding in a car.	2	1	0
2. I avoid driving while under the influence of alcohol or other drugs.	2	1	0
3. I obey traffic rules and the speed limit when driving.	2	1	0
4. I read and follow instructions on the labels of potentially harmful products or substances, such as household cleaners, poisons, and electrical appliances.	2	1	0
5. I avoid using a cell phone while driving.	2	1	0

Safety Score: _____

Disease Prevention			
1. I know the warning signs of cancer, heart attack, and stroke.	2	1	0
2. I avoid overexposure to the sun and use sunscreen.	2	1	0
3. I get recommended medical screening tests (such as blood pressure and cholesterol checks and Pap tests), immunizations, and booster shots.	2	1	0
4. I do not share needles to inject drugs.	2	1	0
5. I am not sexually active, *or* I have sex with only one mutually faithful, uninfected partner, *or* I always engage in safer sex (using condoms).	2	1	0

Disease Prevention Score: _____

Scores of 9 and 10 Excellent! Your answers show that you are aware of the importance of this area to your health. More important, you are putting your knowledge to work for you by practicing good health habits. As long as you continue to do so, this area should not pose a serious health risk.
Scores of 6 to 8 Your health practices in this area are good, but there is room for improvement.
Scores of 3 to 5 Your health risks are showing.
Scores of 0 to 2 You may be taking serious and unnecessary risks with your health.

Using Your Results

How did you score? In which areas did you score the lowest? Are you satisfied with your scores in each area? In which areas would you most like to improve your scores?

_____

_____

What should you do next? To improve your scores, look closely at any item to which you answered "sometimes" or "never." Identify and list at least three possible targets for a health behavior change program. (If you are aware of other risky health behaviors you currently engage in, but that were not covered by this assessment, you may include those in your list.) For each item on your list, identify your current "stage of change" and one strategy you could adopt to move forward (see the section "Enhancing Your Readiness to Change"). Possible strategies might include obtaining information about the behavior, completing an analysis of the pros and cons of change, or beginning a written record of your target behavior.

Behavior	Stage	Strategy
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

SOURCE: Adapted from *Healthstyle: A Self-Test*, developed by the U.S. Public Health Service. The behaviors covered in this test are recommended for most Americans, but some may not apply to people with certain chronic diseases or disabilities or to pregnant women, who may require special advice from their physician.

Design elements: Evidence for Exercise box (shoes and stethoscope): Vstock LLC/Tetra Images/Getty Images; Take Charge box (lady walking): VisualCommunications/E+/Getty Images; Critical Consumer box (man): Sam74100/iStock/Getty Images; Diversity Matters box (holding devices): Robert Churchill/iStockphoto/Rawpixel Ltd/Getty Images; Wellness in the Digital Age box (Smart Watch): Hong Li/DigitalVision/Getty Images

CHAPTER

2 Principles of Physical Fitness

LOOKING AHEAD...

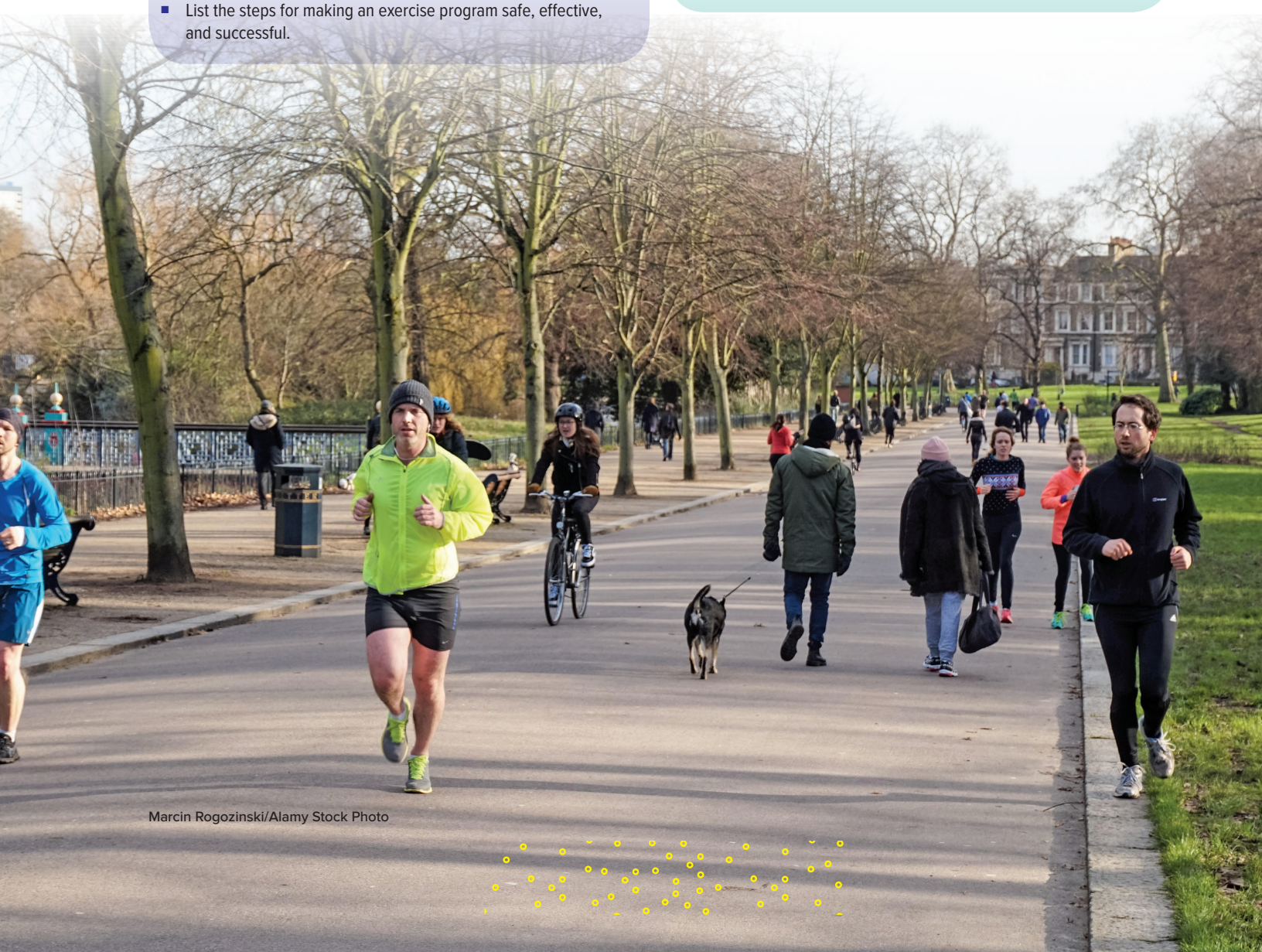
After reading this chapter, you should be able to

- Describe how much physical activity is recommended for developing health and fitness.
- Identify the components of physical fitness and the way each component affects wellness.
- Explain the goal and basic principles of physical training.
- Describe the principles involved in designing a well-rounded exercise program.
- List the steps for making an exercise program safe, effective, and successful.

TEST YOUR KNOWLEDGE

1. To improve your health, you must exercise vigorously for at least 30 minutes straight, 5 or more days per week. True or false?
2. Which of the following activities uses about 150 calories?
   a. washing a car for 45–60 minutes
   b. shooting a basketball for 30 minutes
   c. jumping rope for 15 minutes
   d. all three
3. Regular exercise can make a person smarter. True or false?

See answers on the next page.



Marcin Rogozinski/Alamy Stock Photo

Any list of the benefits of physical activity is impressive. Although people vary greatly in physical fitness and performance ability, the benefits of regular physical activity are available to everyone. Much of the increased health benefits from exercise occurs when going from no activity (sedentary) to some moderate-intensity activity (Figure 2.1). Further health benefits occur when exercising harder or longer. The relative risk of death from all causes and the risk of heart disease decrease by as much as 65% when comparing the least and most active men and women. In Figure 2.1, relative risk of death refers to the risk of death per year of sedentary people compared to people in various activity levels.

This chapter provides an overview of physical fitness. It explains how both lifestyle physical activity and more formal exercise programs contribute to wellness. It also describes the components of fitness, the basic principles of physical training, and the essential elements of a well-rounded exercise program. Chapters 3, 4, 5, and 6 provide in-depth looks at the elements of a fitness program; Chapter 7 puts these elements together in a complete, personalized program.

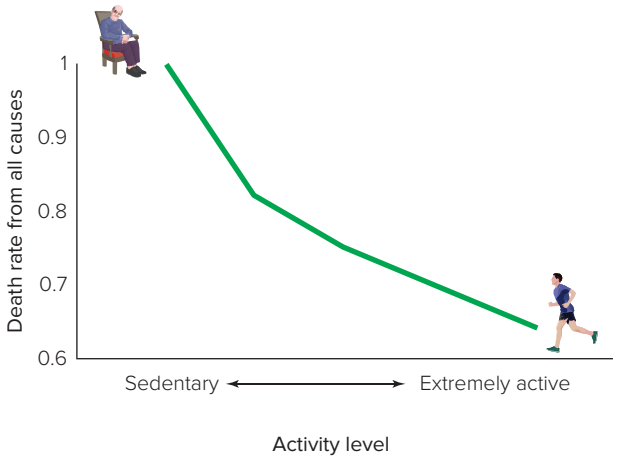


Figure 2.1 Exercise promotes longevity. The risk of death each year from all causes decreases with increased amounts and intensities of weekly physical activity.

SOURCES: Adapted from a composite of 12 studies involving over 300,000 men and women. 2018 Physical Activity Guidelines Advisory Committee. 2018. *2018 Physical Activity Guidelines Advisory Committee Scientific Report.* Washington, DC: U.S. Department of Health and Human Services; Schnohr, P., et al. 2015. "Dose of jogging and long-term mortality: the Copenhagen City Heart Study," *Journal American College of Cardiology* 65(5): 411–419.

PHYSICAL ACTIVITY AND EXERCISE FOR HEALTH AND FITNESS

Almost any physical activity promotes health. Try to be more active during the day, regardless of whether you can fit in a formal workout. Short periods of intense exercise do not compensate for hours of inactivity. So try to get up and move around each hour when studying, working on the computer, or watching TV (see the box "Move More, Sit Less"). Physical activity and exercise are points along a continuum.

Physical Activity on a Continuum

Physical activity is movement that is carried out by the skeletal muscles and requires energy. Different physical activities can vary by ease or intensity. Standing up or walking down a hallway requires little energy or effort, but each is a higher level of activity than sitting or lying down. More intense sustained activities, such as cycling five miles or running in a race, require considerably more effort.

Exercise refers to planned, structured, repetitive movement intended specifically to improve or maintain physical fitness. As discussed in Chapter 1, physical fitness is a set of physical attributes that allows the body to respond or adapt to the demands and stress of physical effort—to perform moderate to vigorous levels of physical activity without becoming overly tired. Levels of fitness depend on such physiological factors as the heart's ability to pump blood and the energy-generating capacity of the cells. These factors in turn depend both on *genetics*—a person's inborn potential for physical fitness—and *behavior*—getting enough physical activity to stress the body and cause long-term physiological changes.

Physical activity is essential to health and confers wide-ranging health benefits, but exercise is necessary to significantly improve physical fitness. This important distinction between physical activity, which improves health and wellness, and exercise, which improves fitness, is a key concept in understanding the guidelines discussed in this section.

Increasing Physical Activity to Improve Health and Wellness According to the U.S. Surgeon General's Office, "Engaging in regular physical activity is one of the most important things that people of all ages can do to improve their health." Physical activity is central to the national prevention strategy to improve health by promoting community design to support active lifestyles, encouraging exercise in young people, providing safe and accessible places for sports and exercise, and supporting physical activity in the workplace. The U.S. Department of Health and Human Services, American College of Sports Medicine, the American Heart Association, and the Surgeon General's Office have made specific exercise recommendations for promoting health. Their reports stress the importance of

Answers (Test Your Knowledge)

1. **False.** Experts recommend at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity per week. The activity can be done in short bouts—10-minute sessions, for example—spread out across the day. Any amount of moderate- to vigorous-intensity physical activity contributes to activity goals.
2. **All three.** The more intense an activity, the more calories it burns in a given amount of time. This is one reason that people who exercise vigorously can get the same benefits in less time than people who exercise longer at a moderate intensity.
3. **True.** Regular exercise (even moderate-intensity exercise) benefits the human brain and nervous system in a variety of ways. For example, exercise improves cognitive function—that is, the brain's ability to learn, remember, think, and reason.

TAKE CHARGE
Move More, Sit Less

A regular exercise program provides huge wellness benefits, but it does not cancel out all the negative effects of too much sitting during the day. Advances in technology promote sedentary behavior; we can now work or study at a desk, watch TV or play video games in our leisure time, order takeout and delivery for meals, and shop and bank online. To avoid the negative health effects of too little daily activity, you may need a plan to reduce your sitting time. Try some of these strategies:

- Stand up and/or walk when you are on work or personal phone calls, in a meeting or study session, or on a coffee break.
- Take the stairs whenever and wherever you can; walk up and down escalators instead of just riding them.
- At work, walk to a coworker's desk rather than e-mailing or calling; take the long route to the restroom; and take a walk break whenever you take a coffee or snack break. Drink plenty of water so that you'll have to take frequent restroom breaks.
- Set reminders to get up and move: Use commercial breaks while watching TV; at work or while using a digital device, use the clock function on your computer or phone to make sure you don't sit for longer than an hour at a time.
- Engage in active chores and leisure activities.
- Track your sedentary time to get a baseline, and then continue monitoring to note any improvements. You can also use a fitness tracker such as the Fitbit or step counter to track your general activity level or to set reminders to get up and move after sitting for a particular length of time.

regular physical activity and emphasize that some physical activity is better than none. They also present evidence that regular activity promotes health and prevents premature death and a variety of diseases (see Figure 2.1). The reports include these key guidelines for adults:

- For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity aerobic physical activity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. As a rule of thumb for calculating a weekly total, 1 minute of vigorous-intensity activity is the equivalent of 2 minutes of moderate-intensity activity. Any amount of moderate- to vigorous-intensity activity contributes to these goals.
- For additional and more extensive health benefits, adults should increase their aerobic physical activity to 300 minutes (5 hours) a week of moderate-intensity activity, or 150 minutes a week of vigorous-intensity activity, or an equivalent combination of moderate- and vigorous-intensity activity. Adults can enjoy additional health benefits by engaging in physical activity beyond this amount. The Health and Retirement Study—a long-term study of older adults sponsored by the National Institute on Aging—found that people who exercised vigorously had a lower death rate than those who exercised at moderate intensities or did no physical activity. After 16 years, the survival rate was 84% in those doing vigorous exercise, 78% in those doing moderate-intensity physical activity, and only 65% in those doing no physical activity.
- Adults should also do muscle-strengthening activities, such as moderate- or high-intensity weight training or body weight exercise involving all major muscle groups on two or more days a week. These activities provide additional health benefits—for example, they prevent muscle loss and falls in older adults.
- Everyone should avoid inactivity. Spend less time in front of a television or computer screen because such inactivity decreases metabolic health, contributes to a sedentary lifestyle, and increases the risk of obesity.

The reports state that physical activity benefits people of all ages and of all racial and ethnic groups, including people with disabilities. The reports emphasize that the benefits of activity outweigh the dangers. These levels of physical activity promote health and wellness by lowering the risk of high blood pressure, stroke, heart disease, type 2 diabetes, colon cancer, and osteoporosis and by reducing feelings of mild to moderate depression and anxiety.

What is moderate physical activity? Activities such as brisk walking, dancing, swimming, cycling, and yard work can all count toward the daily total. A moderate amount of activity uses about 150 **calories** of energy and causes a noticeable increase in heart rate, such as would occur with a brisk walk. Examples of activities that use about 150 calories in 15–60 minutes are shown in Figure 2.2. You can burn the same number of calories by doing a lower-intensity activity for a longer time or a higher-intensity activity for a shorter time. People are most likely to participate in physical activities they enjoy, such as dancing.

In contrast to moderate-intensity activity, *vigorous* physical activity—such as jogging—causes rapid breathing and a

TERMS

physical activity Body movement that is carried out by the skeletal muscles and requires energy.

exercise Planned, structured, repetitive movement intended to improve or maintain physical fitness.

calorie The commonly used term for *kilocalorie,* which is a measure of energy equal to the amount of heat it takes to raise the temperature of 1 liter of water 1°C. One kilocalorie contains 1,000 calories, but the familiar term *calorie* is often used for the larger energy unit, including on food labels.

Figure 2.2 Examples of moderate-intensity physical activity. Each example uses about 150 calories.

SOURCE: National Heart, Lung, and Blood Institute, *Why Is Exercise Important?* (www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/physical/htm; September 1, 2015).

substantial increase in heart rate (Table 2.1). Physical activity and exercise recommendations for promoting general health, fitness, and weight management are shown in Table 2.2.

The daily total of physical activity can be accumulated in multiple bouts of 10 or more minutes per day—for example, two 10-minute bike rides to and from class and a brisk 10-minute walk to the store. In this lifestyle approach to physical activity, people can choose activities that they find enjoyable and that fit into their daily routine; everyday tasks at school, work, and home can be structured to contribute to the daily activity total. If Americans who are currently sedentary were to increase their lifestyle physical activity to 30 minutes per day, both public health and their individual well-being would benefit enormously (see the box "Exercise Is Good for Your Brain").

Increasing Physical Activity to Manage Weight

Because two-thirds of Americans are overweight, the U.S. Department of Health and Human Services has also published physical activity guidelines focusing on weight management. These guidelines recognize that for people who need to prevent weight gain, lose weight, or maintain weight loss, 150–300 minutes per week of physical activity may not be enough. Instead, they recommend up to 90 minutes of physical activity per day. Unfortunately, exercise alone will seldom promote long-term weight loss; but exercise has many health benefits, even in the absence of substantial weight loss.

Exercising to Improve Physical Fitness As mentioned earlier, moderate physical activity confers significant health and wellness benefits, especially for those who are

Table 2.1 Examples of Moderate- and Vigorous-Intensity Exercise

MODERATE-INTENSITY ACTIVITY

Uses 3.5–7 calories per minute and causes your breathing and heart rate to increase but still allows for comfortable conversation:

- Actively playing with children or pets
- Archery
- Ballroom dancing
- Bicycling or stationary bike, moderate pace
- Downhill skiing, moderate intensity
- Figure skating, recreational
- Fly fishing or walking along stream
- Gardening or yard work, moderate pace
- Golf
- Hiking, leisurely pace
- Horseback riding, recreational
- Housework, moderate intensity
- Skateboarding
- Softball
- Using stair-climber, elliptical trainer, or rowing machine, moderate pace
- Table tennis
- Tennis, doubles
- Walking at a moderate pace: walking to school or work, walking for pleasure
- Water aerobics
- Waxing the car
- Weight training and bodybuilding
- Yoga

VIGOROUS-INTENSITY ACTIVITY

Uses more than 7 calories per minute and increases your heart and breathing rates considerably. These exercises cause larger increases in physical fitness:

- Group exercise: high-impact step aerobics, aerobic dance
- Backpacking
- Basketball, recreational
- Bicycling, high intensity
- Calisthenics, vigorous: jumping jacks, burpees, air squats
- Circuit weight training
- Cross-country skiing or snowshoeing
- Cross-training, such as CrossFit
- Downhill skiing, vigorous intensity
- Football, recreational
- Gardening or yard work, shoveling heavy snow, digging ditches
- Hand cycling
- Horseback riding, galloping or jumping
- In line skating
- Interval training: running, elliptical trainer, swimming, cycling
- Jogging
- Kayaking, whitewater
- Pushing a car
- Running up stairs
- Soccer, recreational
- Tennis, singles
- Wheelchair wheeling training

SOURCE: Centers for Disease Control and Prevention. 2015. *General Physical Activities Defined by Level of Intensity.* (http://www.cdc.gov/nccdphp/dnpa/physical/pdf/PA_Intensity_table_2_1.pdf).

Table 2.2 Physical Activity and Exercise Recommendations for Promoting General Health, Fitness, and Weight Management

GOAL	RECOMMENDATION
General health	Perform moderate-intensity aerobic physical activity for at least 150 minutes per week (30 minutes 5 times per week) or 75 minutes of vigorous-intensity physical activity per week (25 minutes 3 times per week). Also, be more active in your daily life: Walk instead of driving, take the stairs instead of the elevator, and watch less television.
Increased health benefits	Exercise at moderate intensity for 300 minutes per week or at vigorous intensity for 150 minutes per week.
Achieve or maintain weight loss	Exercise moderately for 60–90 minutes per day on most days of the week.
Muscle strength and endurance	Perform 1 or more sets of resistance exercises that work the major muscle groups for 8–12 repetitions (10–15 reps for older adults) on at least two nonconsecutive days per week. Examples include weight training and exercises that use body weight as resistance (such as core-stabilizing exercises, pull-ups, push-ups, lunges, and squats).
Flexibility	Perform range-of-motion (stretching) exercises at least two or three days per week. Hold each stretch for 10–30 seconds.
Neuromuscular training	Older adults should do balance training at least two or three days per week. Examples include yoga, tai chi, and balance exercises (standing on one foot, step-ups, and walking lunges). These exercises are beneficial for young and middle-aged adults, as well.

SOURCES: American College of Sports Medicine. 2017. *ACSM's Guidelines for Exercise Testing and Prescription,* 10th ed. Philadelphia: Wolters Kluwer; Garber, C. E., et al. 2011. "Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise," *Medicine and Science in Sports and Exercise* 43(7): 1334–1359; 2018 Physical Activity Guidelines Advisory Committee. 2018. *2018 Physical Activity Guidelines Advisory Committee Scientific Report.* Washington, DC: U.S. Department of Health and Human Services.

currently sedentary and become moderately active. However, people can obtain even greater health and wellness benefits by increasing the duration and intensity of physical activity. With increased activity, they will see more improvements in quality of life and greater reductions in disease and mortality risk.

More vigorous activity, as in a structured, systematic exercise program, also improves physical fitness. Moderate physical activity alone is not enough. Physical fitness requires more intense movement that poses a substantially greater challenge to the body. The American College of Sports Medicine has issued guidelines for creating a formal exercise program that will develop physical fitness. These guidelines are described in detail later in the chapter.

How Much Physical Activity Is Enough?

Some experts believe that people get most of the health benefits of physical activity simply by becoming more active over the course of the day; the amount of activity needed depends on an individual's health status and goals. Other experts believe that leisure-time physical activity is not enough; they argue that people should exercise long enough and intensely enough to improve the body's capacity for exercise—that is, to improve physical fitness. There is probably some truth in both of these positions.

Regular physical activity, regardless of the intensity, makes you healthier and can help protect you from many chronic diseases. Although you get many of the health benefits of exercise by being more active, you obtain even more benefits when you are physically fit. In addition to long-term health benefits, fitness also contributes significantly to quality of life. Fitness can give you freedom to move your body the way you want. Fit people have more energy and better body control. They can enjoy a more active lifestyle than their more sedentary counterparts. Even if you don't like sports, you need physical energy and stamina in your daily life and for many non-sport leisure activities, such as visiting museums, playing with children, and gardening.

Where does this leave you? Most experts agree that some physical activity is better than none, but that more—as long as it does not result in injury—is better than some. To set a personal goal for physical activity and exercise, consider your current activity level, your health status, and your overall goals. At the very least, strive to become more active and do 30 minutes of moderate-intensity activity at least five days per week. Choose to be active whenever you can. If weight management is a concern for you, begin by achieving the goal of 30 minutes of activity per day and then try to raise your activity level further, to 60–90 minutes per day or more. For even better health and well-being, participate in a structured exercise program that develops physical fitness. Any increase in physical activity will contribute to your health and well-being, now and in the future.

COMPONENTS OF PHYSICAL FITNESS

Some components of fitness relate to specific skill activities, such as tennis and skiing, and others to general health. **Health-related fitness** includes the following components:

- Cardiorespiratory endurance
- Muscular strength
- Muscular endurance
- Flexibility
- Body composition

TERMS

health-related fitness Physical capacities that contribute to health: cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition.

THE EVIDENCE FOR EXERCISE

Exercise Is Good for Your Brain

Some scientists call exercise the new "brain food." Studies show that even moderate physical activity can improve brain health and function and may delay the decline in cognitive function that occurs for many people as they age. Regular physical activity has these positive effects on the brain:

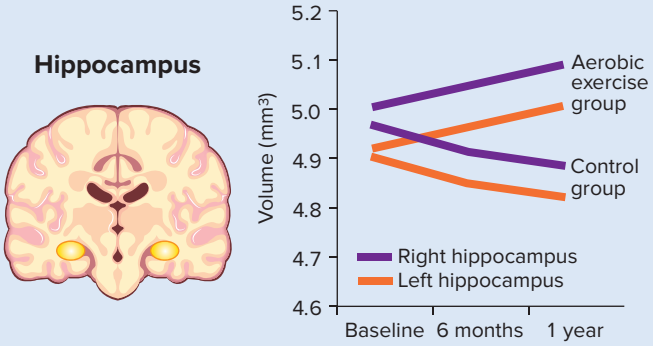
- Endurance and resistance exercise improve cognitive function—the brain's ability to learn, remember, think, and reason. Exercising before an exam might boost your score.
- Exercise can help overcome the negative effects of a poor diet on brain health.
- Exercise promotes the creation of new nerve cells (neurons) throughout the nervous system. By promoting this process (called *neurogenesis*), exercise provides protection against injury and degenerative conditions that destroy neurons. Physical activity is less effective for promoting brain health when exercising in polluted air.
- Exercise enhances the nervous system's *plasticity*—its ability to change and adapt. In the brain, spinal cord, and nerves, this can mean developing new pathways for transmitting sensory information or motor commands.
- Exercise has a protective effect on the brain as people age, helping to delay or even prevent the onset of neurodegenerative disorders such as Alzheimer's disease. Exercise can reduce age-related shrinkage of the hippocampus, a brain structure involved in memory, learning, and emotions.
- Exercise reduces anxiety—a consistent finding independent of culture, gender, age, education, and socioeconomic status. It promotes the release of endorphins, which in turn promotes feelings of well-being and prevents depression.

Although most people consider brain health to be a concern for the elderly, it is vital to wellness throughout life. For this reason, many studies on exercise and brain health include children as well as older adults. Exercise improves health and well-being in people with disorders such as cerebral palsy, multiple sclerosis, and developmental disabilities.

Along with the brain's physical health, mental health is enhanced by exercise. Even modest activity, such as taking a daily walk, can help combat a variety of mental health disorders and improve mood.

It's hard to understate the impact of physical and mental disorders related to brain health. According to the Alzheimer's Association, 5.3 million Americans currently suffer from Alzheimer's disease, and the number is increasing by 70 people per second. People with depression, anxiety, or other mental disorders are more likely to suffer from chronic physical conditions. Taken together, these and other brain-related disorders cost untold millions of dollars in health care costs and lost productivity, as well as thousands of years of productive lifetime lost.

So, for your brain—as well as your muscles, bones, and heart—start creating your exercise program soon. You'll be healthier, and you may even feel a little smarter.



In a study of older adults, aerobic exercise training increased the volume of the hippocampus, effectively reversing age-related loss of volume by 1 to 2 years.

SOURCE: Erickson, K. I., et al. 2011. "Exercise training increases size of hippocampus and improves memory," *Proceedings of the National Academy of Sciences 108*(7), 3017–3022. Reprinted with permission.

SOURCES: 2018 Physical Activity Guidelines Advisory Committee. 2018. *2018 Physical Activity Guidelines Advisory Committee Scientific Report.* Washington, DC: U.S. Department of Health and Human Services; Stubbs, B., et al. 2015. "Physical activity and anxiety," *Journal Affective Disorders* 208, 545–552; Erickson, K. I., et al. 2011. "Exercise training increases size of hippocampus and improves memory," *Proceedings of the National Academy of Sciences* 108(7): 3017–3022; Szuhany, K. L., et al. 2015. "A meta-analytic review of the effects of exercise on brain-derived neurotrophic factor," *Journal of Psychiatric Research* 60, 56–64.

Health-related fitness helps you withstand physical challenges and protects you from diseases.

Cardiorespiratory Endurance

Cardiorespiratory endurance is the ability to perform prolonged, large-muscle, dynamic exercise at moderate to high levels of intensity. It depends on such factors as the ability of the lungs to deliver **oxygen** from the environment to the bloodstream, the capacity of the heart to pump blood, the ability of the nervous system and blood vessels to regulate blood flow, and the capability of the cells' chemical systems to use oxygen and process fuels for exercise and rest.

TERMS

cardiorespiratory endurance The ability of the body to perform prolonged, large-muscle, dynamic exercise at moderate to high levels of intensity.

oxygen An element that makes up 20.8% of the atmosphere that is bound to a second oxygen atom in the environment. It is critical for generating usable energy in the body and is an important component of carbohydrates, fats, and proteins.

When cardiorespiratory fitness is low, the heart has to work hard during normal daily activities and may not be able to work hard enough to sustain high-intensity physical activity in an emergency. As cardiorespiratory fitness improves, related physical functions also improve:

- The heart pumps more blood per heartbeat.
- The ability to consume oxygen due to adaptations in the heart, circulation, and tissues improves.
- Breathing volume decreases during daily activities and submaximal exercising—that is, when exercising at less than full intensity.
- Resting heart rate slows.
- Blood volume increases.
- Blood supply to tissues improves.
- The body can cool itself better.
- Blood vessels become more pliable.
- Resting blood pressure decreases.
- Metabolism in skeletal muscle is enhanced, which improves fuel use.
- The level of antioxidant chemicals in the body increases and oxidative stress decreases. During metabolism, the body naturally produces chemicals called free radicals (oxidative stress) that cause cell damage. Exercise training increases the production of antioxidants that help neutralize free radicals.

A healthy heart can better withstand the strains of everyday life, the stress of occasional emergencies, and the wear and tear of time.

Cardiovascular endurance training also improves the functioning of the body's chemical systems, particularly in the muscles and liver. These changes enhance the body's ability to derive energy from food, allow the body to perform more exercise with less effort, increase sensitivity to insulin, and prevent type 2 diabetes. Exercise reduces blood vessel inflammation, which is linked to coronary artery disease, heart attack, and stroke. Exercise helps maintain normal levels of water and electrolytes in the cells, which in turn preserves muscle cell function and delays fatigue.

Physically fit people also have healthier, more resilient genes. Exercise preserves gene structures called telomeres, which form the ends of the DNA strands and hold them together. Over time the telomeres shorten, reducing their effectiveness, which triggers illness and death. Exercise helps to keep them from getting too short.

Cardiorespiratory endurance is a central component of health-related fitness because heart and lung function is so essential to overall good health. A person can't live long or well without a healthy heart or healthy lungs. Poor cardiorespiratory fitness is linked with heart disease, type 2 diabetes, colon cancer, stroke, depression, and anxiety. A moderate level of cardiorespiratory fitness can help compensate for certain health risks, including excess body fat: People who have higher levels of body fat but who otherwise are fit have been found to have lower death rates than those who are lean but have low cardiorespiratory fitness.

You can develop cardiorespiratory endurance through activities that involve continuous, rhythmic movements of large-muscle groups, such as the legs. Such activities include walking, jogging, cycling, and group aerobics.

Fitness Tip Cardiorespiratory endurance is a key component of health-related fitness. Like studying, you'll be more likely to exercise if you set aside blocks of time for it and make it part of your daily routine. Schedule your workouts, make them a priority, and include alternatives to account for things such as bad weather and vacations.

John P Kelly/The Image Bank/Getty Images

Ask Yourself

QUESTIONS FOR CRITICAL THINKING AND REFLECTION

Does your current lifestyle include enough physical activity—30 minutes of moderate-intensity activity five or more days a week—to support health and wellness? Does your lifestyle go beyond this level to include enough vigorous physical activity and exercise to build physical fitness? What changes could you make in your lifestyle to develop physical fitness?

Muscular Strength

Muscular strength is the ability of a muscle to exert force in a single maximum effort. It depends on such factors as the size of muscle cells and the ability of nerves to activate muscle cells. **Relative strength** is the maximum force exerted relative to body weight, body size, and muscle size. Strong muscles are important for everyday activities, such as climbing stairs, as well as for emergency situations. They help keep the skeleton in proper alignment, preventing back and leg pain and providing the support necessary

TERMS

muscular strength The ability of a muscle to exert force in a single maximum effort.

relative strength The maximum force exerted, relative to body weight, body size, and muscle size.

for good posture. Muscular strength has obvious importance in recreational activities. Strong people can hit a tennis ball harder, kick a soccer ball farther, and ride a bicycle uphill more easily.

Muscle tissue is an important element of overall body composition. Greater muscle mass means faster energy use and a higher rate of **metabolism**, and the sum of all the vital processes by which food energy and nutrients are made available to and used by the body. Greater muscle mass reduces markers of oxidative stress and maintains mitochondria (the "powerhouses" of the cell); both of these benefits are important for metabolic health and long life. Training to build muscular strength can also help people manage stress and boost their self-confidence.

Maintaining strength and muscle mass is vital for healthy aging. Stronger people live longer. Older people tend to experience a decrease in both number and size of muscle cells, a condition called *sarcopenia.* Many of the remaining muscle cells become slower, and some become nonfunctional because they lose their attachment to the nervous system. Strength training (also known as *resistance training* or *weight training*) increases antioxidant enzymes and lowers oxidative stress. It also helps maintain muscle mass and function and possibly helps decrease the risk of osteoporosis (bone loss) in older people, greatly enhancing their quality of life and preventing life-threatening injuries.

Muscular Endurance

Muscular endurance is the ability to resist fatigue and sustain a given level of muscle tension—that is, to hold a muscle contraction for a long time or to contract a muscle over and over again. It depends on such factors as the size of muscle cells, the ability of muscles to store fuel, blood supply, and the metabolic capacity of muscles.

Muscular endurance is important for good posture and for injury prevention. For example, if abdominal and back muscles cannot support and stabilize the spine correctly when you sit or stand for long periods, the chances of low back pain and back injury are increased. Good muscular endurance in the trunk muscles is more important than muscular strength for preventing back pain. Muscular endurance helps people cope with daily physical demands and enhances performance in sports and work.

TERMS

metabolism The sum of all the vital processes by which food energy and nutrients are made available to and used by the body.

muscular endurance The ability of a muscle to remain contracted or to contract repeatedly for a long period of time.

flexibility The ability to move joints through their full ranges of motion.

body composition The proportion of fat and fat-free mass (muscle, bone, and water) in the body.

fat-free mass The nonfat component of the human body, consisting of skeletal muscle, bone, and water.

somatotype A body-type classification system that describes people as predominantly muscular (mesomorph), tall and thin (ectomorph), or round and heavy (endomorph).

skill (neuromuscular)–related fitness Physical capacities that contribute to performance in a sport or an activity, including speed, power, agility, balance, coordination, and reaction time; neuromuscular fitness refers specifically to maintaining performance levels of balance, agility, and coordination through the control of muscles and movement by the brain and spinal column.

Flexibility

Flexibility is the ability to move the joints through their full ranges of motion. It depends on joint structure, the length and elasticity of connective tissue, and nervous system activity. Flexible, pain-free joints are important for good health and well-being. Inactivity causes the joints to become stiffer with age. Stiffness, in turn, often causes people to assume unnatural body postures that can stress joints and muscles. Stretching exercises can help ensure a healthy range of motion for all major joints.

Body Composition

Body composition refers to the proportion of fat and **fat-free mass** (muscle, bone, and water) in the body. Healthy body composition involves a high proportion of fat-free mass and an acceptably low level of body fat, adjusted for age and gender. A person with excessive body fat—especially excess fat in the abdomen—is more likely to experience health problems, including heart disease, insulin resistance, high blood pressure, stroke, joint problems, type 2 diabetes, gallbladder disease, blood vessel inflammation, some types of cancer, back pain, and premature death.

The best way to lose fat is through a lifestyle that includes a sensible diet and exercise. The best way to add muscle mass is through strength training. Large changes in body composition are not necessary to improve health; even a small increase in physical activity and a small decrease in body fat can lead to substantial health improvements.

Somatotype, or body build, affects a person's choice of exercise. *Endomorphs* are round and pear-shaped. They often excel at weight lifting and weight-supported aerobic exercises such as swimming or cycling. Conversely, they might find distance running difficult and painful. *Mesomorphs* are lean and muscular and usually excel at almost any kind of physical activity or sport. *Ectomorphs* are thin and linear. Their light frame helps them succeed in activities such as distance running and ballet. No matter what body type you have, you can benefit from some form of physical activity.

Skill (Neuromuscular)–Related Components of Fitness

In addition to the five health-related components of physical fitness, the ability to perform a particular sport or activity may depend on **skill (neuromuscular)–related fitness**. Neuromuscular refers to the complex control of muscles and movement by the brain and spinal column. The components of skill-related fitness include the following:

- *Speed*—the ability to perform a movement in a short period of time
- *Power*—the ability to exert force rapidly, based on a combination of strength and speed

- *Agility*—the ability to change the position of the body quickly and accurately
- *Balance*—the ability to maintain equilibrium while moving or while stationary
- *Coordination*—the ability to perform motor tasks accurately and smoothly using body movements and the senses
- *Reaction and movement time*—the ability to respond and react quickly to a stimulus

Skill-related fitness tends to be sport-specific and is best developed through practice. For example, playing basketball can develop the speed, coordination, and agility needed to engage in the sport. Participating in sports is fun, can help build fitness, and contributes to other areas of wellness. Young adults often find it easier to exercise regularly when they participate in sports and activities they enjoy, such as dancing, tennis, snowboarding, or basketball.

While not considered a health-related fitness component, neuromuscular fitness is important for healthy aging. Older adults are at risk for life-threatening falls, and development of neuromuscular fitness can reduce the risk of falls. Neuromuscular training activities such as yoga and tai chi are recommended for older adults.

Fitness Tip You don't need to develop the skills of a professional athlete to participate in sports, but boosting sport-specific skills such as speed, power, coordination, and reaction time can make participating in sports more fun. And if you enjoy yourself, you are more likely to stick with the activity!

Clive Mason/Getty Images

PRINCIPLES OF PHYSICAL TRAINING: ADAPTATION TO STRESS

The human body is very adaptable. The greater the demands made on it, the more it adjusts to meet those demands. Over time, immediate, short-term adjustments (**adaptations**) translate into long-term changes and improvements. When breathing and heart rate increase during exercise, for example, the heart gradually develops the ability to pump more blood with each beat. Then, during exercise, it doesn't have to beat as fast to meet the cells' demands for oxygen. The goal of **physical training** is to produce these long-term changes and improvements in the body's functioning and fitness. Although people differ in the maximum levels of physical fitness and performance they can achieve through training, the wellness benefits of exercise are available to everyone (see the box "Fitness and Disability").

Particular types and amounts of exercise are most effective in developing the various components of fitness. To put together an effective exercise program, you should first understand the basic principles of physical training, including:

- Specificity
- Progressive overload
- Reversibility
- Individual differences

All of these rest on the larger principle of adaptation.

Specificity—Adapting to Type of Training

To develop a particular fitness component, you must perform exercises designed specifically for that component. This is the principle of **specificity**. Weight training, for example, develops muscular strength but is less effective for developing cardiorespiratory endurance or flexibility. Specificity also applies to the skill-related fitness components (to improve at tennis, you must practice tennis) and to the different parts of the body (to develop stronger arms, you must exercise your arms). A well-rounded exercise program includes exercises geared to each component of fitness, to different parts of the body, and to specific activities or sports.

Sports science pioneer Franklin Henry from the University of California, Berkeley, developed the principle of specificity of training. His studies showed that a specific movement performed at a specific speed develops a unique skill. Motor-control studies have shown that practice reinforces motor patterns in the brain that are

TERMS

adaptation The physiological changes that occur with exercise training.

physical training The performance of different types of activities that cause the body to adapt and improve its level of fitness.

specificity The training principle that developing a particular fitness component requires performing exercises specifically designed for that component.

DIVERSITY MATTERS
Fitness and Disability

Physical fitness and athletic achievement are not limited to the able-bodied. People with disabilities can also attain high levels of fitness and performance. Elite athletes compete in the Paralympics, the premier event for athletes with disabilities held in the same year and city as the Olympics. The performance of these skilled athletes makes it clear that people with disabilities can be active, healthy, and extraordinarily fit. Just like able-bodied athletes, athletes with disabilities strive for excellence and can serve as role models.

Boomer Jerritt/All Canada Photos/Getty Images

According to the U.S. Census Bureau, about 57 million Americans have some type of chronic disability. Some disabilities are the result of injury, such as spinal cord injuries sustained in car crashes or war. Other disabilities result from illness, such as the blindness that sometimes occurs as a complication of diabetes or the joint stiffness that accompanies arthritis. And some disabilities are present at birth, as in the case of congenital limb deformities or cerebral palsy.

Exercise and physical activity are as important for people with disabilities as for able-bodied individuals—if not more important. Being active helps prevent secondary conditions that may result from prolonged inactivity, such as circulatory or muscular problems. Currently, about 19% of people with disabilities engage in regular moderate-intensity activity.

People with disabilities don't have to be elite athletes to participate in sports and lead an active life. Some health clubs, fitness centers, city recreation centers, and universities offer activities and events geared for people of all ages and types of disabilities. They may have modified aerobics classes, special weight-training machines, classes for mild exercise in warm water, and other activities adapted for people with disabilities. Popular sports and recreational activities include adapted horseback riding, golf, swimming, and skiing. Competitive sports are also available—for example, there are wheelchair versions of billiards, tennis, weight lifting, hockey, and basketball, as well as sports for people with hearing, visual, or mental impairments. For those who prefer to get their exercise at home, special videos are geared to individuals who use wheelchairs or to those with arthritis, hearing impairments, metabolic diseases, or many other disabilities.

The U.S. Department of Education's Office for Civil Rights has issued guidelines for providing equal opportunities for sports and exercise to students with disabilities. Schools and universities must make reasonable modifications to ensure that students with disabilities have equal access to sports and physical education.

If you have a disability and want to be more active, check with your physician about what's appropriate for you. Contact your local community center, university, YMCA/YWCA, hospital, independent living center, or fitness center to locate facilities. Look for a facility with experienced personnel and appropriate adaptive equipment. For specialized videos, check with hospitals and health associations that address specific disabilities, such as the Arthritis Foundation.

specific to a given movement. In other words, there is no general coordination, agility, balance, and accuracy. The balance required in skiing is different from the balance required to stand on one foot or do tricks on a skateboard. Each requires its own specific training.

Progressive Overload—Adapting to the Amount of Training and the FITT-VP Principle

The body adapts to the demands placed on it. When the body is stressed by a greater-than-normal amount or intensity of exercise, the body adapts and improves fitness. The amount of new activity added above a person's usual level of activity is known as *overload*. When this stress is increased progressively, fitness continues to improve. This is the training principle of **progressive overload.**

The amount of overload is important. Too little exercise will have no effect on fitness (although it may improve health); too much may cause injury and problems with the body's immune or endocrine (hormone) systems. The point at which exercise becomes excessive is highly individual; it occurs at a much higher level in an Olympic athlete than in a sedentary person. For every type of exercise, there is a training threshold at which fitness benefits begin to occur, a zone within which maximum fitness benefits occur, and an upper limit of safe training.

The exercise needed to improve fitness depends on the individual's current level of fitness, the person's genetically determined capacity to adapt to training, his or her fitness goals, and the component being developed. A novice, for example, might

TERMS

progressive overload The training principle that progressively increasing amounts of stress on the body causes adaptation that improves fitness.

experience fitness benefits from jogging a mile in 10 minutes, but this level of exercise would not benefit a trained distance runner. Beginners should start at the lower end of the fitness benefit zone; fitter individuals will make more rapid gains by exercising at the higher end of the fitness benefit zone. Progressive overload is critical. Performing the same exercise during every training session will maintain fitness but will not increase it because the training stress is below the threshold required to produce adaptation. Fitness increases only if overload increases.

The overload needed to maintain or improve a particular level of fitness for a particular fitness component is determined through six dimensions, represented by the acronym FITT-VP:

- ***F****requency*—how often
- ***I****ntensity*—how hard or how fast
- ***T****ime*—how long (duration)
- ***T****ype*—mode of activity
- ***V****olume*—how much (frequency × intensity × time)
- ***P****rogression*—how a program advances over time

Chapters 3, 4, and 5 show you how to apply the FITT-VP principle to exercise programs for cardiorespiratory endurance, muscular strength and endurance, and flexibility, respectively.

Frequency Developing fitness requires regular exercise. Optimum exercise frequency, expressed in number of days per week, varies with the component being developed and the individual's fitness goals. For most people, a frequency of three to five days per week for cardiorespiratory endurance exercise and two or more days per week for resistance and flexibility training are appropriate for a general fitness program.

An important consideration in determining appropriate exercise frequency is recovery time. The time required to recover from exercise is highly individual and depends on factors such as training experience, age, and intensity of training. For example, 24 hours of rest between highly intense workouts involving heavy weights or track sprints is not usually enough recovery time for safe and effective training. Intense workouts need to be spaced out during the week to allow for sufficient recovery time. But you can exercise every day if your program consists of moderate-intensity walking or cycling. Learn to "listen to your body" to get enough rest between workouts. Chapters 3, 4, and 5 provide more detailed information about training techniques and recovery periods for workouts focused on different fitness components.

Fitness Tip Progressive overload is important because the body adapts to overload by becoming more fit. This is true even if your starting level of fitness is low. At the gym, don't be intimidated by people who seem to be in better shape than you are. Remember: They got in shape by focusing on themselves, not by worrying about what other people thought about them.

Hero Images/Getty Images

Intensity Fitness benefits occur when a person exercises harder than his or her normal level of activity. The appropriate exercise intensity varies with each fitness component. To develop cardiorespiratory endurance, for example, you must raise your heart rate above normal; you might do that by walking, swimming, or cycling faster. To develop muscular strength, you must lift a heavier weight than normal. To develop flexibility, you must stretch muscles beyond their normal length.

Time (Duration) Fitness benefits occur when you exercise for an extended period. For cardiorespiratory endurance exercise, 20–60 minutes per exercise session is recommended. Exercise can take place in a single session or in several sessions of 10 or more minutes. The greater the intensity of exercise, the less time needed to obtain fitness benefits. For high-intensity exercise, such as running, 20–30 minutes is appropriate. For moderate-intensity exercise, such as walking, 45–60 minutes may be needed. High-intensity exercise poses a greater risk of injury than low-intensity exercise, so if you are a nonathletic adult, first emphasize low- to moderate-intensity activity of longer duration.

To build muscular strength, muscular endurance, and flexibility, similar time is advisable, but training for these health components is more commonly organized in terms of a specific number of *repetitions* of a particular exercise. For resistance training, for example, a recommended program includes one or more sets of 8–12 repetitions of 8–10 different exercises that work the major muscle groups. Older adults should do 10–15 repetitions per set with lighter weights.

Type (Mode of Activity) The exercise in which you should engage varies with each fitness component and with your personal fitness goals. To develop cardiorespiratory endurance, you need to engage in continuous activities involving large-muscle groups—walking, jogging, cycling, or swimming, for example. Resistance exercises develop muscular strength and endurance, and stretching exercises build flexibility. The frequency, intensity, and time of the exercise will be different for each type of activity. (See the section "Designing Your Own Exercise Program" for more on choosing appropriate activities for your fitness program.)

Volume Volume is the product of frequency, intensity, and time—the FIT of exercise. For endurance exercise, average adults should strive to expend at least 1,000 calories per week in

exercise, which is the equivalent of about 150 minutes per week of moderate-intensity exercise. This same volume of exercise can be accomplished in a shorter or longer time frame, depending on the FIT variables. For example, 75 minutes of vigorous-intensity exercise will also burn about 1,000 calories. Volume also applies to other fitness components: In weight training, lifting 10 pounds for 3 sets of 10 repetitions produces a total volume of 300 pounds ($10 \times 3 \times 10$); lifting 20 pounds in the same workout increases the volume to 600 pounds.

Progression Fitness levels off as the body adapts to exercise training, so you need to gradually increase overload over time to improve fitness. How quickly you adapt to training depends on your genetic makeup and the effort you put into your training program. To avoid injury, progress by slowly increasing the volume of exercise; for example, add 5 minutes to your jogging workout or add 10 pounds for a weight training exercise. Don't increase frequency, intensity, and time all at once. With each increase, make sure you can maintain your program before moving forward. Don't overtrain: Excessive exercise can cause injury and fatigue.

Reversibility—Adapting to a Reduction in Training

Fitness is a reversible adaptation. The body adjusts to lower levels of physical activity the same way it adjusts to higher levels. This is the principle of **reversibility**. When a person stops exercising, up to 50% of fitness improvements are lost within two months. However, not all fitness levels reverse at the same rate. Strength fitness is very resilient, so a person can maintain strength fitness by doing resistance exercise as infrequently as once a week. In contrast, cardiovascular and cellular fitness reverse themselves more quickly—sometimes within just a few days or weeks. If you must temporarily reduce the frequency or duration of your training, you can maintain much of your fitness improvement by keeping the intensity of your workouts constant.

Individual Differences—Limits on Adaptability

Anyone watching the Olympics can see that, from a physical standpoint, we are not all created equal. There are large individual differences in our ability to improve fitness, achieve a desirable body composition, and learn and perform sports skills. Some people are able to run longer distances, lift more weight, or kick a soccer ball more skillfully than others will ever be able to, no matter how much they train. People respond to training at different rates, so a program that works for one person may not be right for another person.

TERMS

reversibility The training principle that fitness improvements are lost when demands on the body are lowered.

There are limits on the adaptability—the potential for improvement—of any human body. The body's ability to transport and use oxygen, for example, can be improved by only about 5–30% through training. An endurance athlete must therefore inherit a large metabolic capacity to reach competitive performance levels. In the past few years, scientists have identified specific genes that influence body fat, strength, and endurance. For example, more than 800 genes are associated with endurance performance, and 100 of those determine individual differences in exercise capacity. However, physical training improves fitness regardless of heredity. The average person's body can improve enough to achieve reasonable fitness goals.

DESIGNING YOUR OWN EXERCISE PROGRAM

Physical training works best when you have a plan. A plan helps you make gradual but steady progress toward your goals. First, determine that exercise is safe for you (or your family members); then assess how fit you are, decide what your goals are, and choose the right activities to help you get there.

Getting Medical Clearance

Participating in exercise and sports is usually a wonderful experience that improves wellness in both the short and the long term. In rare instances, however, vigorous exertion is associated with sudden death. It may seem difficult to understand that although regular exercise protects people from heart disease, exercise also increases the risk of sudden death for some.

Exercise and Cardiac Risk Overall, the risk of death from exercise is small—and people are much safer exercising than engaging in many other common activities, including driving a car. One study of joggers found one death for every 396,000 hours of jogging; another study of men involved in a variety of physical activities found one death per 1.5 million hours of exercise.

In people under age 35, congenital heart defects (heart abnormalities present at birth) are the most common cause of exercise-related sudden death. In nearly all other cases, coronary artery disease is responsible. In this condition, fat and other substances build up in the arteries that supply blood to the heart. Death can result if an artery becomes blocked or if the heart's rhythm and pumping action are disrupted. Exercise, particularly intense exercise, may trigger a heart attack in someone with underlying heart disease. The riskiest scenario may involve the middle-aged or older individual who suddenly begins participating in a vigorous sport or activity after being sedentary for a long time. Engaging in very vigorous exercise over the long term can also be risky for some individuals, due to the stress on the cardiovascular system. For example, a study of joggers in Denmark found the lowest mortality rate among those who jogged a moderate amount (2–3 workouts for a total of 60–150 minutes per week); higher rates of death were found among non-joggers and