

8TH EDITION

TOTAL  
FITNESS AND  
WELLNESS

SCOTT K. POWERS   STEPHEN L. DODD



Name: \_\_\_\_\_ Date(s): \_\_\_\_\_

As you complete the key fitness/wellness lab assessments in this course, record your results in the “Pre-Course Assessment” column. At the end of the course, re-do the labs, record your results in the “Post-Course Assessment” column, and see the progress you have made!

Lab	Pre-Course Assessment	Post-Course Assessment
<b>Lab 2.3:</b> Using a Pedometer to Count Your Steps	Average steps taken per day: _____	Average steps taken per day: _____
<b>Lab 2.4:</b> Identifying Barriers to Physical Activity	Barrier 1. Lack of time: _____ Barrier 2. Social and environmental influences: _____ Barrier 3. Lack of resources: _____ Barrier 4. Lack of motivation: _____	Barrier 1. Lack of time: _____ Barrier 2. Social and environmental influences: _____ Barrier 3. Lack of resources: _____ Barrier 4. Lack of motivation: _____
<b>Lab 3.1:</b> Measuring Cardiorespiratory Fitness	<b>1.5-mile run test</b> Finish time: _____ Fitness category: _____ <b>1-mile walk test</b> Finish time: _____ Fitness category: _____ <b>Submaximal cycle test</b> Heart rate: _____ Fitness category: _____ <b>Step test</b> 1 minute recovery HR: _____ (bpm) Fitness category: _____	<b>1.5-mile run test</b> Finish time: _____ Fitness category: _____ <b>1-mile walk test</b> Finish time: _____ Fitness category: _____ <b>Submaximal cycle test</b> Heart rate: _____ Fitness category: _____ <b>Step test</b> 1 minute recovery HR: _____ (bpm) Fitness category: _____
<b>Lab 4.1:</b> Evaluating Muscular Strength	<b>Chest press</b> 1 RM/BW ratio: _____ Fitness category: _____ <b>Leg press</b> 1 RM/BW ratio: _____ Fitness category: _____	<b>Chest press</b> 1 RM/BW ratio: _____ Fitness category: _____ <b>Leg press</b> 1 RM/BW ratio: _____ Fitness category: _____
<b>Lab 4.4:</b> Measuring Muscular Endurance	<b>Push-up assessment</b> Repetitions: _____ Category: _____ <b>Curl-up assessment</b> Repetitions: _____ Category: _____	<b>Push-up assessment</b> Repetitions: _____ Category: _____ <b>Curl-up assessment</b> Repetitions: _____ Category: _____
<b>Lab 5.2:</b> Assessing Flexibility	<b>Sit-and-reach test</b> Reach distance (centimeters): _____ Fitness category: _____ <b>Shoulder flexibility test</b> Left side reach distance (inches): _____ Fitness category: _____ Right side reach distance (inches): _____ Fitness category: _____	<b>Sit-and-reach test</b> Reach distance (centimeters): _____ Fitness category: _____ <b>Shoulder flexibility test</b> Left side reach distance (inches): _____ Fitness category: _____ Right side reach distance (inches): _____ Fitness category: _____
<b>Lab 6.1:</b> Assessing Body Composition	<b>Skinfold test</b> Sum of 3 skinfolds: _____ Percent body fat estimate: _____ Classification: _____ <b>Waist-to-hip ratio</b> Waist: _____ Hip: _____ Waist-to-hip ratio: _____ Disease risk classification: _____ <b>BMI</b> BMI: _____ kg/m <sup>2</sup> Weight classification: _____	<b>Skinfold test</b> Sum of 3 skinfolds: _____ Percent body fat estimate: _____ Classification: _____ <b>Waist-to-hip ratio</b> Waist: _____ Hip: _____ Waist-to-hip ratio: _____ Disease risk classification: _____ <b>BMI</b> BMI: _____ kg/m <sup>2</sup> Weight classification: _____
<b>Lab 8.1:</b> Analyzing Your Diet (Three-day nutrient summary from SuperTracker on ChooseMyPlate.gov)	Average total calories: _____ kcal Average calories from fat: _____ kcal Average protein intake: _____ gm Average carbohydrate intake: _____ gm Average fiber intake: _____ gm Average fat intake: _____ gm Average cholesterol intake: _____ mg Average sodium intake: _____ mg	Average total calories: _____ kcal Average calories from fat: _____ kcal Average protein intake: _____ gm Average carbohydrate intake: _____ gm Average fiber intake: _____ gm Average fat intake: _____ gm Average cholesterol intake: _____ mg Average sodium intake: _____ mg
<b>Lab 9.1:</b> Determining Ideal Body Weight	% body fat: _____ Weight: _____ lb BMI: _____ kg/m <sup>2</sup> Ideal weight: _____ kg	% body fat: _____ Weight: _____ lb BMI: _____ kg/m <sup>2</sup> Ideal weight: _____ kg
<b>Lab 9.2:</b> Estimating Daily Caloric Expenditure	Estimated calorie intake: _____ Estimated daily caloric expenditure: _____	Estimated calorie intake: _____ Estimated daily caloric expenditure: _____
<b>Lab 10.2:</b> Understanding Your Risk for Cardiovascular Disease	Family risk for CVD, total points: _____ Lifestyle risk for CVD, total points: _____ Additional risks for CVD, total points: _____	Family risk for CVD, total points: _____ Lifestyle risk for CVD, total points: _____ Additional risks for CVD, total points: _____
<b>Lab 11.2:</b> Stress Index Questionnaire	Number of Yes answers: _____ Stress category: _____	Number of Yes answers: _____ Stress category: _____
<b>Lab 13.1:</b> Determining Your Cancer Risk	Number of Yes answers: _____	Number of Yes answers: _____
<b>Lab 14.1:</b> Inventory of Attitudes and Behaviors toward Sexually Transmitted Infections	Number of True answers: _____ Number of False answers: _____ Risk level: _____	Number of True answers: _____ Number of False answers: _____ Risk level: _____
<b>Lab 15.1:</b> Alcohol Abuse Inventory	Number of Yes answers: _____ How risky is your alcohol use? _____	Number of Yes answers: _____ How risky is your alcohol use? _____

# Behavior Change

# Contract

Choose a health behavior that you would like to change, starting this quarter or semester. Sign the contract at the bottom to affirm your commitment to making a healthy change and ask a friend to witness it.

My behavior change will be:

\_\_\_\_\_

My long-term goal for this behavior change is:

\_\_\_\_\_

Barriers that I must overcome to make this behavior change are (things that I am currently doing or situations that contribute to this behavior or make it hard to change):

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

The strategies I will use to overcome these barriers are:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Resources I will use to help me change this behavior include:

A friend/partner/relative \_\_\_\_\_

A school-based resource \_\_\_\_\_

A community-based resource \_\_\_\_\_

A book or reputable website \_\_\_\_\_

In order to make my goal more attainable, I have devised these short-term goals:

Short-term goal \_\_\_\_\_ Target date \_\_\_\_\_ Reward \_\_\_\_\_

Short-term goal \_\_\_\_\_ Target date \_\_\_\_\_ Reward \_\_\_\_\_

Short-term goal \_\_\_\_\_ Target date \_\_\_\_\_ Reward \_\_\_\_\_

When I make the long-term behavior change described above, my reward will be:

\_\_\_\_\_ Target date \_\_\_\_\_

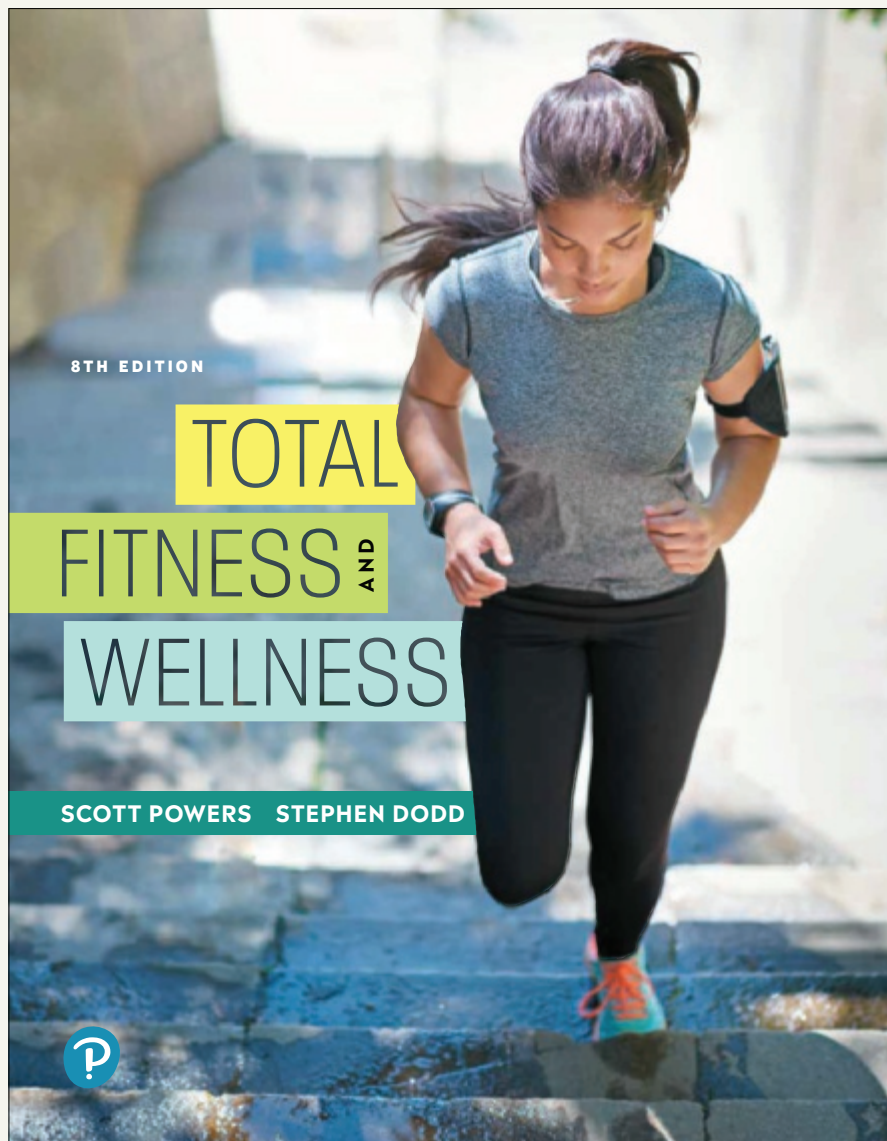
I intend to make the behavior change described above. I will use the strategies and rewards to achieve the goals that will contribute to a healthy behavior change.

Signed \_\_\_\_\_ Date \_\_\_\_\_

Witness \_\_\_\_\_ Date \_\_\_\_\_

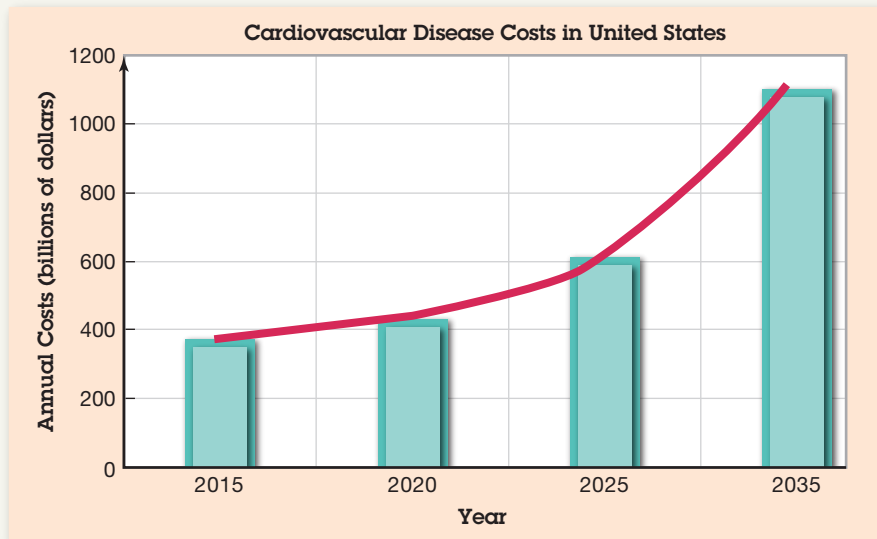
# Strengthen Students' Core Knowledge of Fitness and Wellness

***Total Fitness and Wellness*** gives students a solid foundation in fitness and wellness, while providing them with the tools they need to make healthy behavioral changes and lifestyle choices. The **8th Edition** presents current research and topics of student interest such as eating disorders, stress-management strategies, Pilates, diabetes and pre-diabetes, and emotional health. MyDietAnalysis—a diet and activity tracking tool that gives students an easy way to analyze their physical activity and daily nutrient intake—is now included at no extra charge with **Mastering Health**.





# Cover Current Research and . . .



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## Current research and statistics

include objectives from Healthy People 2020 and myplate.gov. Coverage includes current topics of student interest such as eating disorders, stress-management strategies, barefoot running, Pilates, diabetes and pre-diabetes, ergogenic dietary supplements, at-home fitness equipment, antioxidants, and emotional health.

**NEW!** Expanded coverage of non-traditional workouts and modifications for special populations ensure all students and fitness levels are included.

## EXAMINING THE EVIDENCE

### What Is CrossFit and Does It Work?

One of the latest trends in fitness programs is the incorporation of various activities performed at a high intensity into your routine. CrossFit, one such program, has become widely popular in recent years, with more than 10,000 affiliates worldwide. It is a training system that uses constantly varied, functional movements at relatively high intensity. It could be described as "high-intensity power training." CrossFit is also characterized as a community that develops when people perform these workouts together. The communal aspect is credited as being a key part of the program's success.

Is CrossFit effective in improving aerobic endurance and body composition? A recent study addressed this question (22). Researchers tested male and female subjects across a range of initial fitness levels and then trained them for 10 weeks using the CrossFit system. The study found that all subjects, no matter the initial fitness level, increased  $\dot{V}O_2$  max by 12% to 14%. In addition, body fat decreased 13% to 19%. Thus, it appears that high-intensity power training can be an effective way to improve fitness and serve as a beneficial addition to your workout program. You can learn more at [www.crossfit.com](http://www.crossfit.com)

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# Offer Labs that Interest Students

**Integration of fitness assessment lab material** throughout the book aligns the assessments with the topics from the text.

do it! LABS  
Complete Lab 6.1 online in the study area of **Mastering Health**.

## laboratory 6.1

Name \_\_\_\_\_ Date \_\_\_\_\_

Scan to view the exercise demonstration videos.




### Assessing Body Composition

**EQUIPMENT**  
Tape measure, skinfold caliper, scale

**DIRECTIONS**  
Complete the assessments described below as directed by your instructor. Then record your body composition data and weight classifications for skinfold, waist circumference, waist-to-hip ratio, BMI, and/or other measures in the spaces below.




**SKINFOLD TEST**

**Men**

Abdomen
Chest
Thigh

**Women**



Suprailium
Triceps
Thigh

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**NEW!** Autograded Labs: Muscular Endurance - The Push-Up and Curl-Up Tests

**The Curl-Up Test**  
You can perform the curl-up test as follows:

1. Lie on your back with your legs shoulder-width apart, your knees bent 90 degrees, your arms straight at your sides, and your palms flat on the mat (Figure a below).
2. Extend your arms so that your fingertips touch a strip of tape perpendicular to your body. A second strip of tape is located toward the feet and parallel to the first (10 cm apart).
3. Use the technique provided on a mat whose set to 50 lifts per minute. Slowly curl up your upper torso until your fingers touch the second strip of tape (Figure b below). Then slowly return to the lying position with your head and shoulder blades touching the mat and your fingertips touching the first strip of tape. Breathe normally throughout, exhaling during the curl-up stage.
4. Have your partner count the number of successful curl-ups you do in 1 min, maintaining the minimum posture and without pausing, to a maximum of 20.

[Click here to view a demonstration video of the curl-up test.](#)

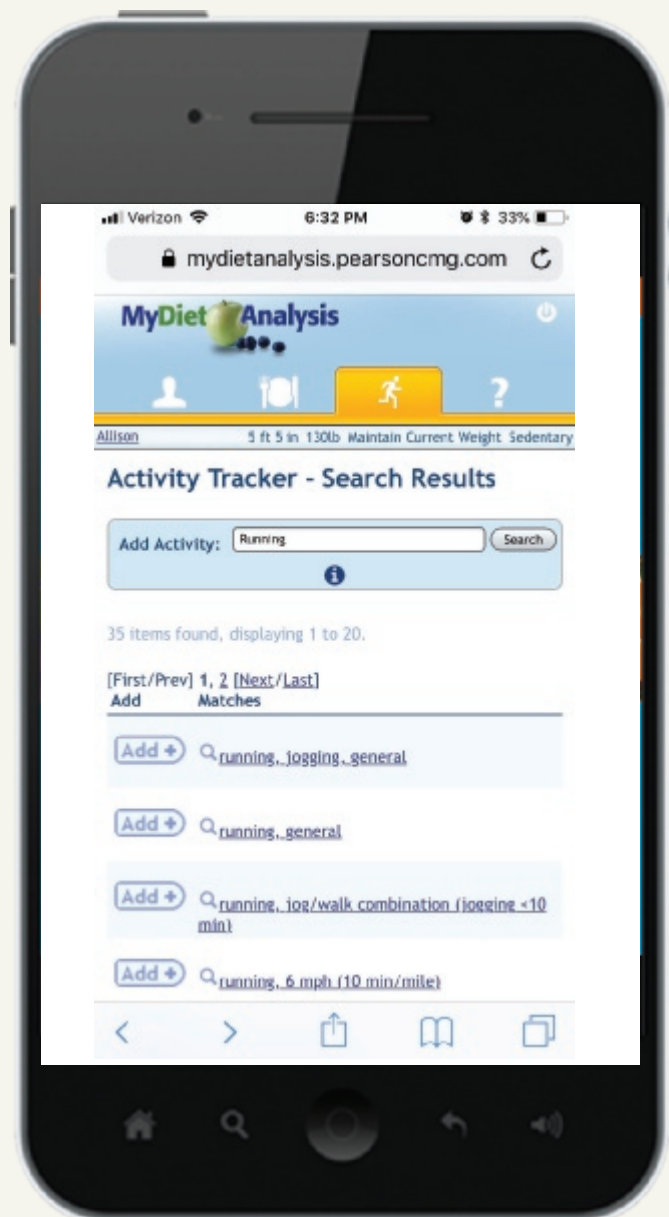
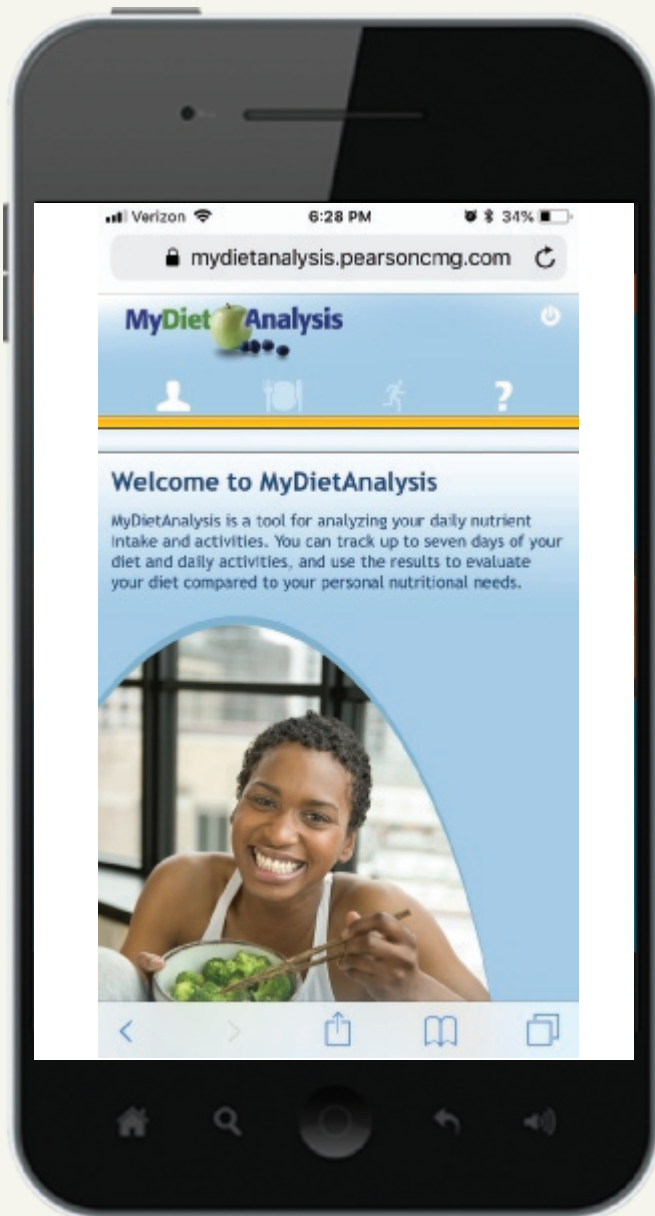
**Part D - Recording Your Score for the Curl-Up Test**  
Record your score in the essay box below:

Essay answers are limited to about 500 words (3000 characters maximum, including spaces).  
3000 Character(s) remaining

**Auto-graded, assignable labs** address current trends such as social networking, time management (page 327), and substance abuse addiction (pages 422–423), and allow students to apply textual information to practical issues, encouraging the immediate development of healthy lifestyle choices and a core fitness plan.

# Help Students Track their Physical Activity and Daily Nutrient Intake

**NEW!** MyDietAnalysis is included with **Mastering Health at no additional charge**, and offers an up-to-date, accurate, reliable, and easy-to-use program for your students to track and analyze their physical activity and daily nutrient intake.



With **MyDietAnalysis**, students can track their diet and activity intake accurately—even from the gym—from any device!

# Encourage Behavior Change

**steps** → **STEPS FOR BEHAVIOR CHANGE**

**Do you have trouble making healthy behavior changes?**

*Answer the following questions about your typical efforts to change a health behavior.*

**Y N**

- Do you have a specific game plan?
- Do you get help from your friends and family?
- Do you set goals?
- Do you reward yourself for your successes?

If you answered no to most or all of the questions, then you should consider using the behavior change contract in the front of the text.

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## Steps for Behavior Change

focus students on evaluating their own behaviors (e.g., Are you a fast food junkie? Are you reluctant to strength train? Do you protect your skin from UV light?) and present them with practical steps they can take to make meaningful behavior change.

## Behavior Change

**Videos** guide students through the best tips and practices to put better decision making into action and review basic fitness concepts. These concise whiteboard-style videos help students with the steps of behavior change, covering topics such as setting SMART goals, identifying and overcoming barriers to change, planning realistic timelines, and more. All videos include assessment activities and are assignable in Mastering Health.

**Understanding How Change Works**

**In the Action Stage:**

- ✓ Successful alteration of behavior on a scale of 1 day to 6 months.
- ✓ Expend significant effort to reach a particular behavior criterion or outcome.

Transtheoretical Model Stages of Behavior Change

Precontemplation → Contemplation → Preparation → Action → Maintenance → Termination

00:45 / 04:06



# Coach Students Through the Course

## coaching corner

Don't skip  
dance Monday!

An important principle associated with a successful exercise program is consistency. If you have always considered fitness optional, it may be helpful to reframe that thought process. Consider adopting the mantra that *daily exercise is nonnegotiable*.

- Schedule your exercise sessions at convenient times of day to ensure consistency.
- Create a schedule of fitness activities that includes several options for cardiorespiratory, strength, and flexibility training.
- Exercise with friends when possible—this enhances both the physical and social dimensions of wellness.
- Develop a backup plan for days when you are less motivated. Some activity is always better than no activity.

**Coaching Corner** gives students practical fitness and wellness advice and strategies to help them put their changes into action.

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## Exercise Videos

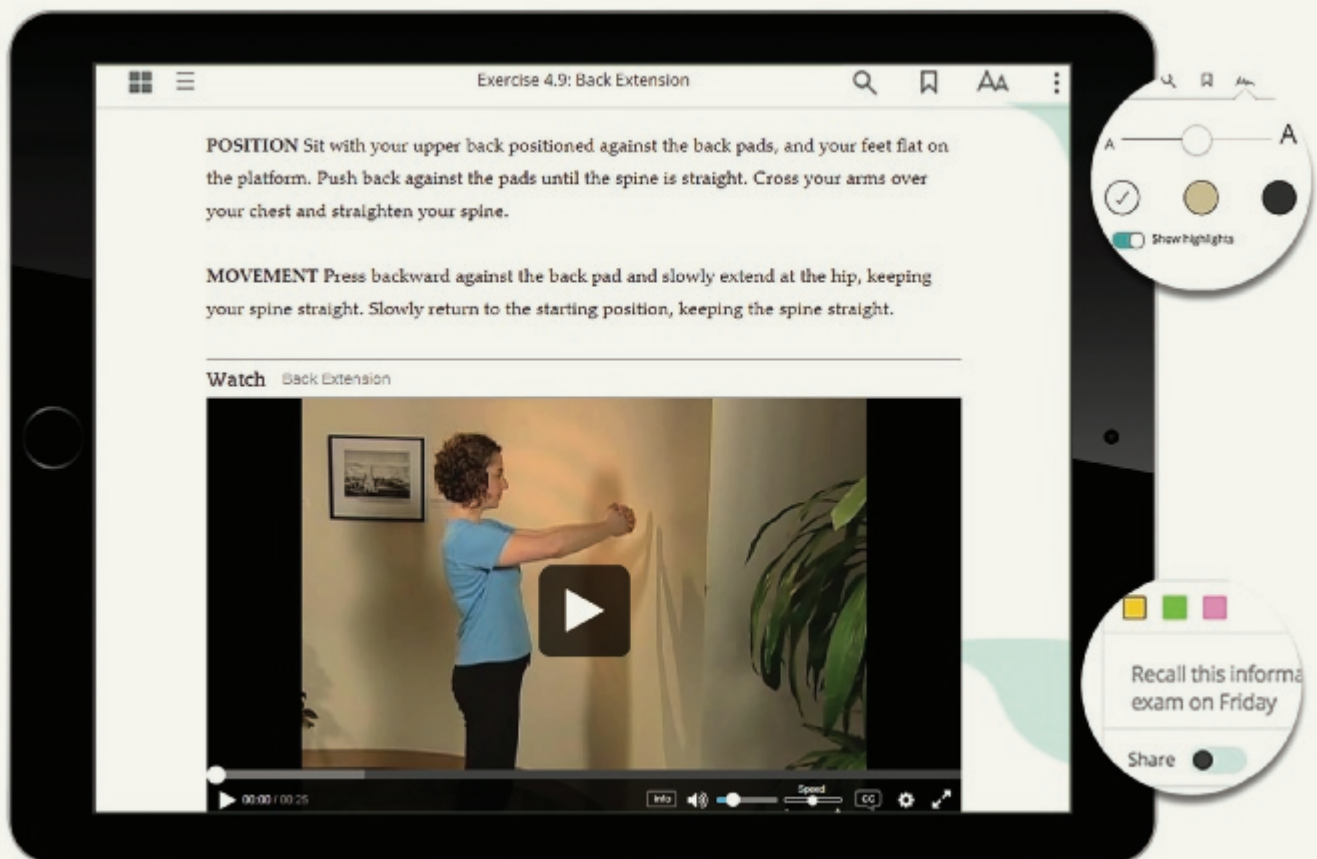
feature demonstrations of strength training and flexibility exercises, with a focus on safety and adaptive techniques for at-home workouts. The videos feature resistance bands, stability balls, free weights, and machines allowing users a wide variety of exercises to choose from based on their individual preferences and access to equipment.



# Give Students Anytime, Anywhere Access with Pearson eText

**Pearson eText** is a simple-to-use, mobile-optimized, personalized reading experience available within Mastering. It allows students to easily highlight, take notes, and review key vocabulary all in one place—even when offline. Seamlessly integrated videos and other rich media engage students and give them access to the help they need, when they need it. Pearson eText is available within Mastering when packaged with a new book; students can also purchase Mastering with Pearson eText online.

For instructors not using Mastering, Pearson eText can also be adopted on its own as the main course material.











# Instructor Support You Can Rely On

**Total Fitness and Wellness** includes a full suite of instructor support materials in the Instructor Resources area in Mastering Health, including an Instructor's Resource and Support Manual, Test Bank, and editable labs.

Instructor Resources Contents	
eText	>
Downloads	
<b>Resources by Chapter</b> Links to downloadable resources for each chapter.	>
Instructor's Resource and Support Manual	+
Test Bank	+
Labs	+

Each chapter also includes numerous PowerPoint presentations, including accessible lecture presentations with and without media, and all labeled and unlabeled images from the text.

PowerPoint Presentation Tools	
<b>Chapter 6 Accessible Lecture Presentation</b> Note: The Microsoft Accessibility Checker may flag a table without alt text as an error; however, true tables can be read by screen readers and are accessible. Contact <a href="mailto:disability.support@pearson.com">disability.support@pearson.com</a> with questions.	zip, 2.9 MB 
<b>Chapter 6 Lecture Presentation</b>	zip, 6.5 MB 
<b>Chapter 6 Lecture Presentation with Embedded Media</b>	zip, 102.3 MB 
<b>Chapter 6 Clicker Questions</b>	zip, 791 KB 
<b>Chapter 6 Quiz Show</b>	zip, 113 KB 
<b>Chapter 6 Step Edit</b>	zip, 309 KB 
JPEG Images	
<b>Chapter 6 JPEG Images</b> Labeled and unlabeled images from the text.	zip, 5.3 MB 
<b>Chapter 6 Tables</b>	zip, 335 KB 

EIGHTH EDITION

# Total Fitness and Wellness

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To Jen, Haney, and Will. Your love and encouragement have always meant more than you will ever know.

—STEPHEN L. DODD

To my mother, who encouraged me to pursue academic endeavors.

—SCOTT K. POWERS

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# About the Authors



**Scott K. Powers** is currently the UAA Endowed Professor and a distinguished professor within the Department of Applied Physiology and Kinesiology at the University of Florida. Dr. Powers's research focuses upon the effects of exercise and inactivity on the health of both cardiac and skeletal muscles. Collectively, Dr. Powers's research has resulted more than 255 peer-reviewed publications, and many of these publications are widely cited in the literature. Importantly, Dr. Powers is also an accomplished teacher as indicated by the fact that he has won numerous teaching awards and has been inducted by the University of Florida as a member of the Academy of Distinguished Teaching Scholars. Moreover, Dr. Powers has also been recognized by the University of Florida as the teacher/scholar of the year in 2017.



**Stephen Dodd** is a professor in the Department of Applied Physiology and Kinesiology at the University of Florida. He has been teaching graduate and undergraduate courses such as exercise physiology, environmental exercise physiology, clinical exercise physiology, and assessment in kinesiology at the university for more than 25 years. He has won numerous teaching awards and served two terms as department chair. His research has focused on how skeletal muscle adapts to an increase/decrease in exercise.



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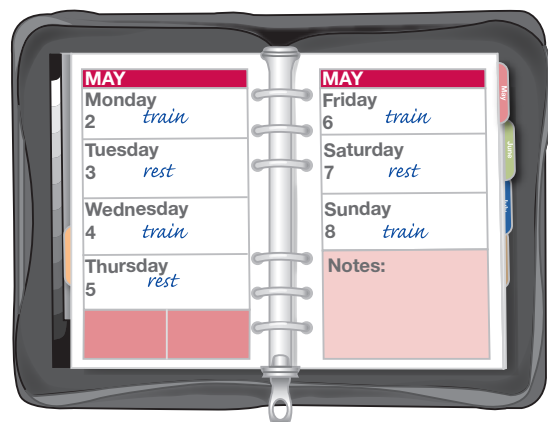
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# Preface

**G**ood health is our most precious possession. However, it is important to appreciate that good health is not simply the absence of disease. This fact led health professionals to revise the concept of good health and to introduce a new term—wellness, which includes not only good physical health but also involves excellent emotional, intellectual, spiritual, social, and environmental health. Importantly, our daily lifestyle choices can have a major impact on our ability to achieve wellness.

Intended for an introductory college course, *Total Fitness and Wellness* focuses on aiding students to effect positive changes in their lifestyles, most notably in exercise and diet. The interaction of exercise and diet and the essential role of regular exercise and good nutrition in achieving total fitness and wellness are major themes of the text.

*Total Fitness and Wellness* was built on a strong foundation of both exercise physiology and nutrition. The text provides clear, objective, research-based information to college students during their first course in physical fitness and wellness. By offering a research-based text, we hope to dispel many myths associated with exercise, nutrition, weight loss, and wellness. In particular, we show students how to evaluate their own wellness level with respect to various wellness components, such as fitness level and nutritional status. Indeed, the title of the book reflects our goals.

Numerous physical fitness and wellness texts are available today. Our motivation in writing *Total Fitness and Wellness* was to create a unique, well-balanced physical fitness and wellness text that covers primary concepts of physical fitness and wellness, and also addresses other important issues such as behavior change, exercise-related injuries, exercise and the environment, and prevention of cardiovascular disease.

## New to This Edition

*Total Fitness and Wellness*, 8th Edition maintains many features that the text has become known for, while incorporating several major revisions, exciting new features, and a more explicit connection between the text and multimedia resources in Mastering Health. **Mastering Health** is an online homework, tutorial, and assessment product designed to improve results by helping students quickly master concepts. Students benefit from self-paced tutorials that feature immediate wrong-answer feedback and hints that emulate the office-hour experience to help keep students on track. With a wide range of interactive, engaging, and assignable activities, students are encouraged to actively learn and retain tough course concepts.

The multimedia created for 8th Edition is more innovative and interactive than ever and a tighter text–Mastering Health integration provides students the opportunity to master course content using a variety of resources on and off the page, reflecting the manner in which students study today.

The most hallmark features and noteworthy changes to the text and multimedia as a whole include the following:

- **Numbered learning outcomes** introduce every chapter giving students a roadmap for their reading. Each chapter concludes with a **Study Plan**, which summarizes key points of the chapter and provides review questions to check understanding, all tied to the chapter’s learning outcomes and assignable in Mastering Health.
- **Examining the Evidence** feature boxes give the reader insight into special topics such as the effects of caffeine, the search for a cure for AIDS, muscle cramps, and anabolic steroid use.
- **Creating Your Total Fitness and Wellness Plan (Chapter 7)** provides students with practical, step-by-step instructions on developing and putting fitness and wellness plans into action.
- **MP3 Chapter Reviews** are assignable in Mastering Health.
- **The book’s design and layout** have been thoroughly revitalized for today’s students. In addition to new photos and figures, the end-of-chapter labs and sample exercise prescription programs have been redesigned.
- **Suggested Readings** have been moved from the back of book and integrated into the end-of-chapter content to be more visible and useful for students.
- **ABC News Videos**, all referenced in the book with See It! callouts, bring fitness and wellness to life and spark discussion with up-to-date hot topics. Mastering Health activities tied to the videos include multiple choice questions that provide wrong-answer feedback to redirect students to the correct answer.
- **Pearson eText** complete with embedded Exercise videos and ABC News videos, is mobile friendly and ADA accessible.
  - Now available on smartphones and tablets.
  - Seamlessly integrated videos.
  - Accessible (screen-reader ready).
  - Configurable reading settings, including resizable type and night reading mode.
  - Instructor and student note-taking, highlighting, bookmarking, and search.

## Chapter-by-Chapter Revisions

The 8th Edition has been thoroughly updated to provide students with the most current information and references for further exploration and includes a tighter integration between the text and multimedia resources in Mastering Health. Portions of chapters have been reorganized to improve the flow of topics, and figures, tables, feature boxes, and photos have all been added, improved on, and updated. Throughout the text, all data, statistics, and references have been updated to the most recent possible. The following is a chapter-by-chapter listing of some of the most noteworthy changes, updates, and additions.

### Chapter 1:

- This chapter underwent major revision to improve both content and student understanding
- Includes the latest statistics on life expectancy in the United States and new information about the factors that contribute to longevity
- Contains new content on the number of American adults that engage in the recommended amount of exercise to promote health
- Expanded coverage on the health hazards of prolonged sitting and discussion of workstation alternatives to conventional sitting workstations
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 2:

- New Consumer Corner discussing buying considerations for fitness trackers
- New information added on the percentage of Americans that engage in healthy exercise activities
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 3:

- Consolidation of “Make sure you know” summaries
- New information on “Warm Up” exercises
- New information on injuries in Crossfit training
- Consolidation of QR codes linked to videos to facilitate use by the reader
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 4:

- Consolidation of “Make sure you know” summaries
- Consolidation of QR codes linked to videos to facilitate use by the reader
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 5:

- Consolidation of “Make sure you know” summaries
- New video of leg stretching added
- New analysis of sitting posture added
- New “Appreciating Diversity” box added (*Can Flexibility Be Maintained During Pregnancy?*)
- Consolidation of QR codes linked to videos to facilitate use by the reader
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 6:

- Consolidation of “Make sure you know” summaries
- New information added to describe the health risks associated with obesity
- Consolidation of QR codes linked to videos to facilitate use by the reader
- New data for Figure 6.3 on U.S. obesity rates
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 7:

- Consolidation of “Make sure you know” summaries
- Updated Table 7.1 to provide overview of apps to monitor fitness levels
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 8:

- This chapter underwent major revision to improve both content and student learning
- New and expanded information on the role that specific omega-3 fatty acids play in the prevention of heart disease
- New information about the protein requirements for athletes and physically active people
- Latest information on dietary supplements
- New research on antioxidant benefits
- New information on prebiotics/probiotics and the human microbiome
- Addition of several new figures to improve student learning
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 9:

- Latest research on the role that ingestion of fructose plays in fat weight gain
- New information on the recommended percentage of body fat across the life span

- Latest information on the new FDA-approved prescriptions for weight loss
- Updated information about those factors that regulate appetite
- Latest information on the CDC recommendations for weight loss
- New research on the success rate for commercial weight loss plans
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 10:

- Latest statistics on the incidence of cardiovascular disease in the United States
- New information on the estimates of the health care costs associated with cardiovascular disease
- New “Examining the Evidence” box discussing “Can regular exercise offset the negative health consequences of prolonged sitting?”
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 11:

- Consolidation of “Make sure you know” summaries
- New videos demonstrating breathing exercise
- Added new information on stress management
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 12:

- Consolidation of “Make sure you know” summaries
- Reorganization of Lab 12.2
- Updated “Suggested Readings” and “References”

### Chapter 13:

- Latest statistics on incidence of cancers in the United States
- New information describing the main types of cancers
- Expanded discussion of carcinogens
- New “Examining the Evidence” highlighting the evidence that regular exercise reduces the risk of 13 different cancers
- New discussion on the role that the hepatitis B virus plays in development of liver cancer
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 14:

- Updated information on the stages of HIV/AIDS.
- Latest statistics on the incidence of major STIs in the United States and around the world.
- Expanded discussion on the treatment of hepatitis B
- Updated “Suggested Readings,” “Weblinks,” and “References”

### Chapter 15:

- New information on problem gambling
- Latest statistics on rates of drug addiction in United States
- Latest research on the influence of opioid abuse on the body
- Expanded discussion on the health effects of e-cigarettes
- New information on the health effects of long-term use of caffeine
- Updated “Suggested Readings,” “Weblinks,” and “References”

## Text Features and Learning Aids

In addition to the new and revised features described above, continuing features and learning aids in the book that contribute to student success include:

- **Lab exercises** allow students to apply textual information to practical issues, encouraging the immediate development of healthy lifestyle choices and a core fitness plan.
- **Sample fitness and wellness programs** offer easy-to-follow instructions for implementing successful fitness and wellness programs.
- **Coaching Corner** boxes represent the “teacher’s voice” throughout the text, offering helpful hints and strategies to overcome fitness and wellness obstacles.
- **Consumer Corner** boxes teach students to be informed and discerning health and fitness consumers, guiding them to make the best fitness and wellness decisions in a market full of fads, gimmicks, and gadgets.
- **Appreciating Diversity** boxes present current health research, covering issues such as how the risk of cancer varies across the United States and how the incidence of drug abuse varies across populations.

- **Steps for Behavior Change** boxes focus students on evaluating their own behaviors (e.g., Are you reluctant to strength train?, Do you protect your skin from UV light?). New timelines present students with practical steps they can take to make meaningful behavior change.
- **Consider This!** grabs students' attention with surprising statistics and information, prompting them to pause and consider the long-term consequences of specific health behaviors.

## Instructor Supplements

A full resource package accompanies *Total Fitness and Wellness* to assist the instructor with classroom preparation and presentation.

- **Mastering Health** ([www.masteringhealthandnutrition.com](http://www.masteringhealthandnutrition.com) or [www.pearsonmastering.com](http://www.pearsonmastering.com)). Mastering Health coaches students through the toughest fitness and wellness topics. Instructors can assign engaging tools to help students visualize, practice, and understand crucial content, from the basics of fitness to the fundamentals of behavior change. **Coaching Activities** guide students through key health concepts with interactive mini-lessons, complete with hints and wrong-answer feedback. **Reading Quizzes** (20 questions per chapter) ensure students have completed the assigned reading before class. **ABC News Videos** stimulate classroom discussions and include multiple-choice questions with feedback for students. **NutriTools Coaching Activities** in the nutrition chapter allow students to combine and experiment with different food options and learn firsthand how to build healthier meals. **MP3s** relate to chapter content and come with multiple-choice questions that provide wrong-answer feedback. **Learning Catalytics** provides open-ended questions students can answer in real time. Through targeted assessments, **Learning Catalytics** helps students develop the critical thinking skills they need for lasting behavior change. For students, the **Study Area** is broken down into learning areas and includes videos, MP3s, practice quizzing, and much more.
- **Instructional Resources (Download Only)**  
The instructional resources available for downloading in the Mastering Health Instructor Resources area include everything an instructor needs to prepare for their course and deliver a dynamic lecture in one convenient place. Resources include: *ABC News* videos; exercise videos; clicker questions; Quiz Show questions; PowerPoint lecture outlines; all figures and tables from the text; PDF and Microsoft Word files of the *Instructor Resource and Support Manual*; PDF, RTF, and Microsoft Word files of the Test Bank; the Computerized Test Bank; the User's Quick Guide; and *Teaching with Student Learning Outcomes*, *Teaching with Web 2.0*, *Great Ideas! Active Ways to Teach Health and Wellness*, *Behavior*

*Change Log Book and Wellness Journal*, *Eat Right! Live Right!*, and *Take Charge of Your Health* worksheets.

- **ABC News Videos and Video Tutors.** *ABC News* videos, each 3 to 8 minutes long, help instructors stimulate critical discussion in the classroom. Videos are embedded within PowerPoint lectures and are also available separately in large-screen format with optional closed captioning through MasteringHealth.
- **Instructor Resource and Support Manual.** This teaching tool provides chapter summaries, outlines, integrated *ABC News* video discussion questions, in-class discussion questions, and more.
- **Test Bank.** The Test Bank incorporates Bloom's Taxonomy, or the higher order of learning, to help instructors create exams that encourage students to think analytically and critically, rather than simply to regurgitate information. Test Bank questions are tagged to global and book-specific student learning outcomes.
- **Teaching with Student Learning Outcomes.** This publication contains essays from 11 instructors who are teaching using student learning outcomes. They share their goals in using outcomes, the processes that they follow to develop and refine the outcomes, and provide many useful suggestions and examples for successfully incorporating outcomes into a personal health course.
- **Teaching with Web 2.0.** From Facebook to Twitter to blogs, students are using and interacting with Web 2.0 technologies. This handbook provides an introduction to these popular online tools and offers ideas for incorporating them into your personal health course. Written by personal health and health education instructors, each chapter examines the basics about each technology and ways to make it work for you and your students.
- **Great Ideas! Active Ways to Teach Health & Wellness.** This manual provides ideas for classroom activities related to specific health and wellness topics, as well as suggestions for activities that can be adapted to various topics and class sizes.
- **Behavior Change Log Book and Wellness Journal.** This assessment tool helps students track daily exercise and nutritional intake and create a long-term nutritional and fitness prescription plan. It also includes a Behavior Change Contract and topics for journal-based activities.

## Student Supplements

### Mastering Health

**The Study Area of Mastering Health** is organized by learning areas within the Study by Chapter section." after "by learning areas. The *Read It!* section contains the Learning Outcomes and up-to-date health news. *See It!*



includes *ABC News* videos on important health topics and Behavior Change videos. More than 100 exercise videos demonstrate strength training and flexibility exercises with resistance bands, stability balls, free weights, and gym machines. The exercise videos are also available for download onto iPods or media players. *Hear It!* contains MP3 Study Tutor files and audio case studies. *Do It!* contains the choose-your-own-adventure-style interactive “*Behavior Change Activities—Which Path Would You Take?*”, interactive NutriTools activities, and Web links. Also in this section is a pre-course/post-course assessment that lets students evaluate their own fitness and wellness status both before and after taking the course. New interactive labs are also available online to students, allowing them to assess their levels of fitness and wellness, learn core skills, and develop behavior change plans to track their progress. Students can easily complete the labs and e-mail them to you directly—eliminating the need for paper entirely.

*Review It!* contains Practice Quizzes for each chapter, Flashcards, and Glossary. *Live It!* will help jump-start students’ behavior-change projects with interactive Assess Yourself Worksheets and resources to plan change; students can fill out a Behavior Change Contract, journal and log behaviors, and prepare a reflection piece.

**Pearson eText** included within Mastering Health, contains embedded *ABC News* videos and other rich media, is mobile friendly and ADA accessible, is available on smartphones and tablets, and includes instructor and student note-taking, highlighting, bookmarking, and search functions.

**Behavior Change Log Book and Wellness Journal**, found within the *Live It!* section in Mastering Health, helps students track daily exercise and nutritional intake and create a long-term nutrition and fitness prescription plan. It includes Behavior Change Contracts and topics for journal-based activities.

## Additional Student Supplements

**MyDietAnalysis** ([www.mydietanalysis.com](http://www.mydietanalysis.com)). Powered by ESHA Research, Inc., MyDietAnalysis features a database of nearly 50,000 foods and multiple reports. It allows students to track their diet and activity using up to six profiles and to generate and submit reports electronically. MyDietAnalysis is available at no additional cost in Mastering Health, as well as sold separately as a standalone purchase for those who do not use Mastering Health.

## Acknowledgments

First and foremost, this edition of *Total Fitness and Wellness* reflects the valuable feedback provided by many people throughout the country. As always, this edition could not

have been completed without the work of an enormous number of people at Pearson. From the campus sales representatives to the president of the company, they are truly first rate, and our interaction with them is always delightful.

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# Understanding Fitness and Wellness



## LEARNING OUTCOMES

- 1 Define *wellness* and discuss the eight components of wellness.
- 2 Describe the wellness goals of the United States as established by the *Healthy People 2020* initiative.
- 3 Explain the nature of exercise and physical activity and the health benefits of exercise.
- 4 Identify and discuss the five major components of health-related physical fitness.
- 5 Explain how lifestyle plays a role in overall wellness and why it is important to assess your current health habits.
- 6 Explain the process of behavior change and name and describe the six phases that are part of the stages of change model.
- 7 Discuss the strategies and tactics that are effective in maintaining motivation for change and eliminating barriers to change.
- 8 Explain the necessity of SMART goals and create a behavior change action plan that addresses at least one health-related target behavior.



Lifestyle decisions have a major impact on your overall health and well-being. In this book, you will learn about lifestyle factors (behaviors) that can reduce your risk of disease and put you on the path to physical fitness and optimal wellness.

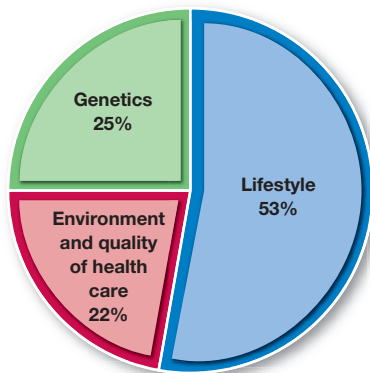
## Life Expectancy and Wellness

LO **1** Define *wellness* and discuss the eight components of wellness.

Although life expectancy in the United States increased from 1975 to 2014, life expectancy has recently declined. The current average life expectancy in the United States is now 76.1 years for men and 81.1 years for women. Unfortunately, experts predict that life expectancy in the United States will continue to *decrease* during the next decade due to the burden caused by several major diseases and the increasing number of deaths due to drug overdose (e.g., opioid abuse).

In the United States, cardiovascular disease remains the leading cause of death, followed by cancer and respiratory diseases. Deaths due to diabetes are on the rise, as well. A healthy lifestyle can reduce your risk of disease; for example, eating a nutritionally balanced diet, exercising regularly, and maintaining a healthy body weight reduce your risk of cardiovascular disease, diabetes, and several types of cancer. Abstaining from smoking and avoiding secondhand cigarette smoke reduce your risk of developing both cardiovascular and respiratory diseases.

According to the Surgeon General, the four major factors that influence health and longevity are lifestyle, genetics, the environment, and quality of health care. Of these factors, *lifestyle has the greatest impact on human longevity*, as 53% of the variation in longevity is lifestyle related. The second major factor that contributes to health and longevity is genetics; studies of families reveal that 25% of longevity is due to genetic factors. Finally, approximately 23% of variation in longevity is due to the combination of the environment and the quality of



**FIGURE 1.1** The three major factors that contribute to health and longevity.

## consider this!

In a given year, approximately 1 in 4 adults between the ages of 18 and 44 has a diagnosable mental disorder.

health care (**FIGURE 1.1**). These statistics reveal that we control as much as 75% of our vulnerability to disease, so the actions we take to safeguard our health and create wellness can have a huge impact.

## What Is Wellness?

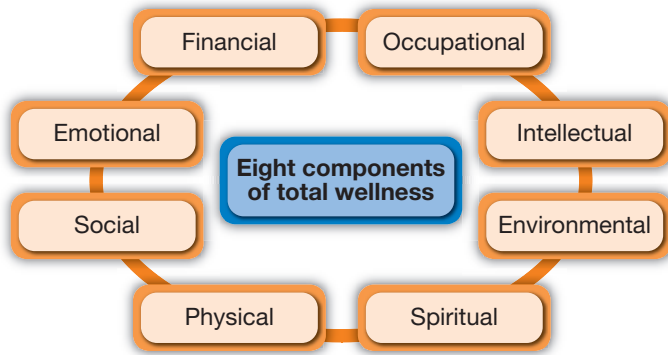
Good health was once defined as the absence of disease. In the 1970s, many exercise scientists and health educators became dissatisfied with this limited definition. These visionary health professionals believed that health includes physical fitness and emotional and spiritual health as well. Their revised concept of good health is called **wellness** (1). Wellness can be defined as *optimal health*, which encompasses all the dimensions of well-being. You can achieve a state of wellness by practicing a healthy lifestyle that includes regular physical activity, proper nutrition, emotional/spiritual balance, and eliminating unhealthy behaviors. Wellness involves a number of components that we will explore in more depth.

## Eight Components of Wellness

Wellness consists of eight interrelated components (**FIGURE 1.2**):

- Physical wellness
- Emotional wellness
- Intellectual wellness
- Spiritual wellness
- Social wellness
- Environmental wellness
- Occupational wellness
- Financial wellness

**Physical Wellness** Physical wellness refers to all the behaviors that keep your body healthy. Two key aspects are maintaining a healthy body weight and achieving physical fitness. Maintaining a healthy body weight is important because a high percentage of body fat increases your risk of developing type 2 diabetes and heart disease. Physical fitness has a positive effect on your health by reducing your risk of disease and improving your quality



**FIGURE 1.2** Total wellness consists of eight interrelated components. Optimal well-being occurs when all components of wellness are working together toward holistic health.

of life. Eating a healthy diet, obtaining regular medical exams, and practicing personal safety are other important physical health behaviors.

**Emotional Wellness** Emotions play an important role in how you feel about yourself and others. Emotional wellness (mental health) includes your social skills and interpersonal relationships. Your level of self-esteem and your ability to cope with the routine stress of daily living are also aspects of emotional wellness.

*Emotional stability* refers to how well you deal with day-to-day stressors. Most people are well equipped to handle life's ups and downs, but inability to handle everyday situations can lead to poor emotional health or conditions such as depression and anxiety disorders. In fact, mental disorders are the leading cause of disability for people between the ages of 15 to 44 years (2). Emotional wellness means being able to respond to life situations in an appropriate manner, therefore avoiding prolonged periods of an extremely high or low emotional state.

**Intellectual Wellness** You can maintain intellectual wellness by keeping your mind active through lifelong learning. College life is ideal for developing this component. Attending lectures, reading, and engaging in thoughtful discussions with friends and teachers all promote intellectual health. Your ability to define and solve problems continues to grow, and continuous learning can provide you with a sense of fulfillment. Take advantage of opportunities to broaden your mind. Listen to audio books, keep up with current events, and engage in thoughtful discussions with others.

**Spiritual Wellness** The term *spiritual* means different things to different people. Most definitions of spiritual wellness include having a sense of meaning and purpose. Many people define spiritual wellness based on religious beliefs, but it is not limited to religion. People find meaning in helping others, being altruistic, enjoying the beauty of nature, or through prayer. However you define spiritual

health, it is an important aspect of wellness because it is closely linked to emotional health (3).

Optimal spiritual wellness includes the ability to understand your basic purpose in life; to experience love, joy, pain, peace, and sorrow; and to care for and respect all living things. Anyone who has experienced a beautiful sunset or smelled the first scents of spring can appreciate the pleasure of maintaining optimal spiritual health.

**Social Wellness** Social wellness is the development and maintenance of meaningful interpersonal relationships; this results in a support network of friends and family. Good social health helps you feel confident in social interactions and provides you with emotional security. It is not necessarily the number of people in your support network, but the quality of those relationships that is important. Developing good communication skills is crucial for maintaining a strong social network.

**Environmental Wellness** Environmental wellness includes the influence of the environment on your health, as well as your behaviors that affect the environment. Our environment can have a positive or negative impact on



Meditating or spending time outdoors can help you improve spiritual health.

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**wellness** A state of optimal health that encompasses all the dimensions of well-being. Consists of eight major components: physical, emotional, intellectual, spiritual, social, environmental, occupational, and financial wellness.

---

our total wellness. For example, air pollution and water contamination are environmental factors that can harm physical health. Breathing polluted air can lead to a variety of respiratory disorders. Drinking water contaminated with harmful bacteria can lead to infection, and drinking water that contains carcinogens increases the risk of certain types of cancers.

Your environment can also have a positive influence on wellness. For example, a safe environment evokes feelings of comfort and security, enhancing your emotional health. If your environment is safe, you are more likely to spend time outside being active and improving your physical health.

Our relationship with our environment is a two-way street. How do our behaviors influence the environment? Do you recycle regularly, or does much of your trash end up in a landfill? Do you carpool or take public transportation when you can?

Achieving total wellness requires learning about the environment, protecting yourself against environmental hazards, and being responsible in regard to your impact on the environment.

### HEAR IT!

#### Case Study

How can Omar connect his physical, mental, and spiritual health? Listen to the online case study at **Mastering Health**.

**Occupational Wellness** Occupational wellness is achieved by a high level of satisfaction in your job or chosen career. This stems from work that provides personal fulfillment, mental stimulation, and good relationships with coworkers, clients, and others in your professional life. While a high income may be desirable, it does not guarantee occupational wellness. Occupational wellness is achieved when people enjoy their work and receive recognition for their skills and performance. Like the other components, occupational wellness is not an independent element but an important contributor to emotional, intellectual, and social wellness.

To achieve occupational wellness, establish career goals that are consistent with your interests, skills, and personal values. For instance, a career in health care or military service can be a good choice for people who value service to others. In contrast, those who place a high value on financial security may find a higher-paying career essential for their occupational wellness.

**Financial Wellness** Financial wellness refers to the ability to live comfortably on your income and have the means to save for financial emergencies and goals such as education and retirement. Financial wellness involves your ability to manage your money in a responsible way. It can provide you with peace of mind and contribute to your emotional, social, and occupational wellness.

### Interaction of Wellness Components and the Wellness Continuum

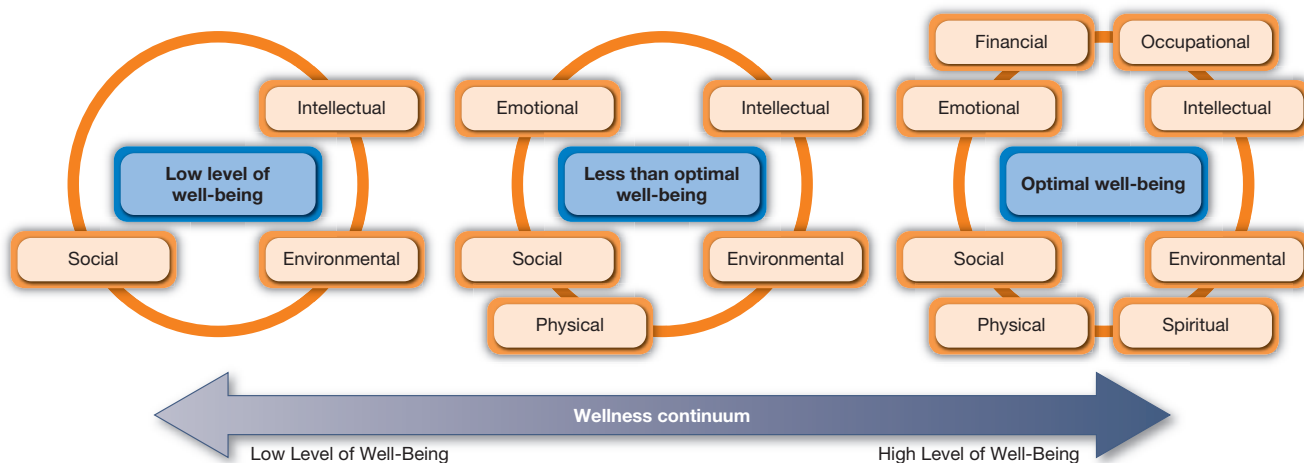
None of the components of wellness works in isolation; all eight work closely together. For example, people with an anxiety or depressive disorder who also have a chronic physical illness report more physical symptoms than those who do not have a mental health disorder (4). Strong spirituality is associated with lower rates of mental disorders, better immune function, and greater participation in health-promoting behaviors (3, 5). Total wellness is achieved through a balance of all aspects of wellness.

It is clear that wellness is a dynamic process. The choices you make each day move you along a *continuum* of wellness. At one end of the continuum is total well-being, which is realized by achieving all eight components of wellness simultaneously (FIGURE 1.3). At the opposite end of the

### LIVE IT!

#### Assess Yourself

Assess your health with the *Multidimensional Health Locus of Control Take Charge of Your Health!* Worksheet online at **Mastering Health**.



**FIGURE 1.3** A person’s state of wellness moves along a continuum. Accomplishing optimal well-being (right) requires realizing all eight components of wellness. A low level of well-being (left) results when an individual has successfully addressed only a limited number of wellness components.

## APPRECIATING DIVERSITY

### Wellness Issues Across the Population

While your behaviors have a significant impact on your health, other factors also influence your risk for certain chronic diseases. Ethnicity, sex, age, family history, and socioeconomic status affect your risk of developing diabetes, cancer, cardiovascular disease, obesity, and other conditions.

For example, black Americans have a higher risk of hypertension (high blood pressure) compared to the U.S. population as a whole (53). Similarly, diabetes is more common in Native Americans and Latinos than in people from other ethnic backgrounds (54). Men and women differ in their risk for heart disease, osteoporosis, and certain types of cancer (55).

Aging also plays a role. The risk of chronic diseases such as heart disease and cancer increases with age. And people of low socioeconomic status often have less

access to quality health care and experience higher rates of obesity, heart disease, and drug abuse. Our goal is to achieve optimal wellness, but individual and demographic differences can present special challenges.



continuum is a low level of well-being, which results from achieving only a few wellness components. You can move toward optimal well-being by eliminating unhealthy behaviors and making healthy habits part of your regular routine. Complete Laboratory 1.1 to determine your overall wellness level.

goals are to achieve health equity, eliminate disparities, and improve the health of all Americans. For more details, see the Examining the Evidence box on the next page and visit [www.healthypeople.gov](http://www.healthypeople.gov).

#### LO 1 Make sure you know...

- *Wellness* is defined as optimal health, which encompasses all dimensions of well-being. It is a dynamic process that moves along a continuum.
- There are eight interacting components of wellness: physical, emotional, intellectual, spiritual, social, environmental, occupational, and financial wellness.

#### LO 2 Make sure you know...

- *Healthy People 2020* is a set of wellness goals established by the U.S. government. Goals include attaining high-quality, longer lives, reducing the risk of injury and premature death, achieving health equity, eliminating disparities, and improving the health of all groups.

## Wellness Goals for the Nation

LO 2 Describe the wellness goals of the United States as established by the *Healthy People 2020* initiative.

A nation of unhealthy people drains resources by reducing worker productivity and increasing government spending on health care. To improve the overall well-being of Americans, the U.S. government established a set of wellness goals known as the *Healthy People* initiative. These goals were first presented in 1980 and have since been revised every 10 years based on progress toward meeting the objectives. *Healthy People 2020* is the current set of goals aimed at attaining high-quality, longer lives and reducing the risk of injury and premature death. Other health-related

## What Is Exercise and Why Should I Do It?

LO 3 Explain the nature of exercise and physical activity and the health benefits of exercise.

When you hear the word *exercise*, do you picture someone running on a treadmill? Or do you imagine hiking up a scenic mountain with a group of friends? Actually, both activities are forms of exercise that are good for your health. There are numerous fun and interesting ways to exercise, so if going to the gym is not your thing, there are many other ways to be active. One part of designing your personal fitness program is to find out what works best for *you*.

### Exercise Is One Type of Physical Activity

*Physical activity* and *exercise* are terms that define different concepts linked to human movement. **Physical activity**



## EXAMINING THE EVIDENCE

### Understanding *Healthy People 2020*

Government agencies and public health professionals developed the *Healthy People 2020* goals. The overall vision of this initiative is to achieve a society in which all people live long and healthy lives. Specific objectives include:

- Reduce the proportion of adults who engage in no leisure-time activity.
- Reduce the death rates due to breast cancer, prostate cancer, and melanoma.
- Increase the proportion of physician office visits that include counseling or education related to nutrition or weight.
- Increase the number of states with nutrition standards for foods and beverages provided to preschool-age children in child care.

- Increase the proportion of adolescents who are connected to a parent or other positive adult caregiver.
- Reduce the proportion of adolescents who engage in disordered eating behaviors in an attempt to control their weight.
- Reduce the proportion of persons engaging in binge drinking of alcoholic beverages.
- Increase the proportion of older adults who are up to date on a core set of clinical preventive services.
- Increase the proportion of adults who get sufficient sleep.

Source: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, [www.healthypeople.gov](http://www.healthypeople.gov).

includes all physical movement, regardless of the level of energy expenditure or the reason you do it (6). Physical activity can be occupational (done as part of your job), lifestyle, or leisure time. Lifestyle activity includes housework, walking to class, and climbing stairs. Leisure-time physical activity is any activity performed during your free time.

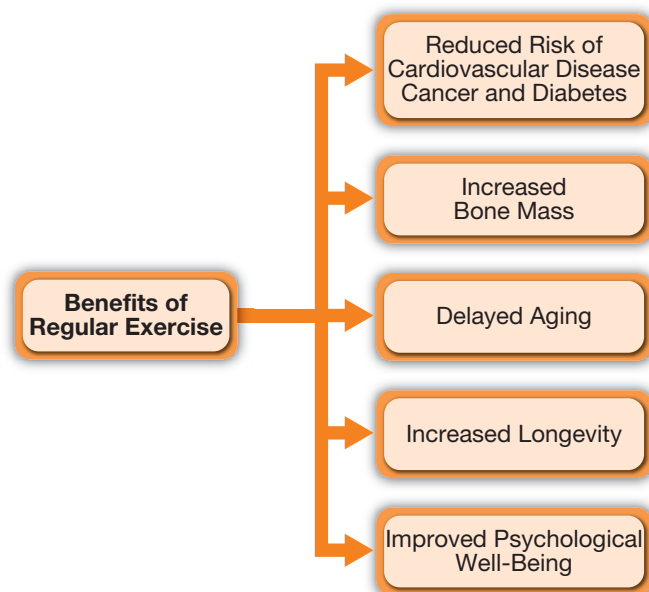
**Exercise** is a type of physical activity that is planned, structured, and has a final goal of improving or maintaining physical fitness (6). Virtually all fitness/conditioning activities and sports are considered exercise because they are planned and help maintain or improve physical fitness. Exercise often involves relatively high-intensity activities (such as running or swimming) and is performed with the goal of achieving health and fitness. Although you can gain health benefits from all types of physical activity, exercise produces the greatest benefits.

### Health Benefits of Exercise and Physical Activity

A recent report from the U.S. Centers for Disease Control and Prevention (CDC) reveals that only 20% of American adults engage in the recommended amount of exercise to promote health. Most of us are aware that there are many health benefits gained from regular exercise and physical activity. In addition to improving muscle tone and reducing body fat, regular exercise improves our fitness levels and ability to perform everyday tasks. Perhaps even more important, it can help you achieve total wellness (2, 7–15).

The importance of regular exercise and physical activity is emphasized in the U.S. Surgeon General's report on

physical activity and health (16). This report concludes that lack of physical activity is a major public health problem and that all Americans can improve their health by engaging in as little as 30 minutes of light- to moderate-intensity physical activity most days of the week. This report recognizes numerous health benefits of physical activity and exercise (**FIGURE 1.4**). Keep in mind that different levels of physical activity or exercise are needed for different health benefits.



**FIGURE 1.4** Regular exercise can produce numerous health benefits.

**Reduced Risk of Heart Disease** **Cardiovascular disease (CVD)** (disease of the heart and blood vessels) is a major cause of death in the United States. In fact, one in three Americans dies of CVD (17). Regular physical activity and exercise can significantly reduce your risk of developing CVD (1, 7, 8, 10, 11, 17–21), and strong evidence suggests that regular physical activity reduces the risk of dying during a heart attack (**FIGURE 1.5**) (22–25). Note from Figure 1.5 that exercise training can reduce the magnitude of cardiac injury during a heart attack by more than 60% (23, 24). Many preventive medicine specialists argue that these facts alone are reason enough for engaging in regular physical activity and exercise (7, 18, 26).

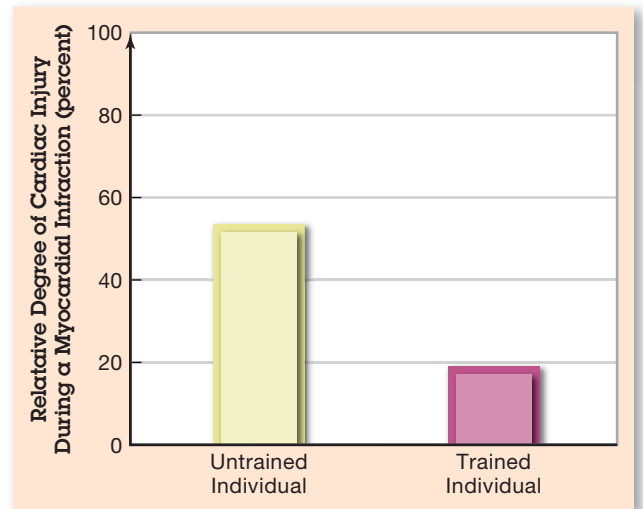
**Reduced Risk of Diabetes** **Diabetes** is a disease characterized by high blood sugar (glucose) levels. Poorly managed diabetes increases your risk for numerous health problems, including blindness, heart disease, and kidney dysfunction. Regular physical activity and exercise can reduce the risk of type 2 diabetes by improving skeletal muscle health and the regulation of blood glucose (9, 27, 28).

**Lower Risk of Cancer** Cancer is a major cause of disease and death worldwide. The primary risk factors for cancer are environmental (exposure to cancer-causing agents) and lifestyle (45). One lifestyle factor associated with increased cancer risk is physical inactivity. Convincing evidence indicates that a sedentary lifestyle increases the risk of colon cancer (45), and growing evidence suggests that regular exercise can reduce the risk of 13 types of cancer including breast and endometrial cancer in women (45). At present, it is unclear if regular exercise can reduce the risk of other forms of cancer.

**Increased Bone Mass** The bones of the skeleton provide a mechanical lever system to permit movement and protect internal organs. Loss of bone mass and strength is called **osteoporosis**, and it increases the risk of bone fractures. Therefore, it is important to maintain strong, healthy bones. Although osteoporosis can occur in men and women of all ages, it is most common in older women.

Exercise can improve bone health by strengthening your bones. Mechanical force applied by muscular activity is a key factor in regulating bone mass and strength. Numerous studies have demonstrated that regular exercise increases bone mass, density, and strength in young adults (29–31). In particular, weight-bearing activities, such as running, walking, and resistance training, are important for bone health. Research on osteoporosis suggests that regular exercise can prevent bone loss in older adults and is also useful in treating osteoporosis (29).

**Delayed Aging** As we age, we gradually lose our physical capacity to do work, and therefore our ability to perform strenuous activities progressively declines. Although this decline may begin as early as the 20s, the



**FIGURE 1.5** Regular endurance exercise protects the heart against injury during heart attack. During a myocardial infarction (heart attack), exercise-trained individuals suffer less cardiac injury compared to untrained individuals.

Source: Borges J. P., et al., Delta Opioid Receptors: The Link between Exercise and Cardio protection. PLoS ONE 9(11): e113541. doi:10.1371/journal.pone.0113541, 2014.

most dramatic changes occur after about age 60 (32–34). Although no amount of physical activity or exercise can stop the biological aging process, regular exercise can delay the age-related decline in physical working capacity (32, 35, 36). Indeed, note the differences in physical working capacity among highly trained, moderately trained, and inactive individuals in **FIGURE 1.6**. Although physical working capacity declines with age, regular exercise can maintain your ability to perform various types of physical activities, increasing your ability to enjoy a lifetime of physical recreation and an improved quality of life.

**Increased Longevity** Abundant research reveals that regular physical activity and exercise (combined with a healthy lifestyle) can increase longevity (7, 8, 25, 37–39). A classic study of Harvard alumni concluded that men with a sedentary lifestyle have a 31% greater risk of death from all causes than men who engage in regular

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**physical activity** Movement of the body produced by a skeletal muscle that results in energy expenditure.

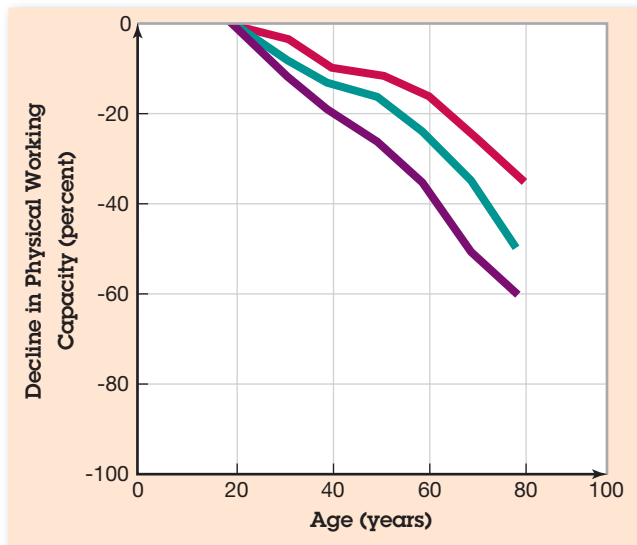
**exercise** Planned, structured, and repetitive bodily movement done to improve or maintain one or more components of fitness.

**cardiovascular disease (CVD)** Disease of the heart and blood vessels.

**diabetes** Metabolic disorder characterized by high blood glucose levels.

**osteoporosis** Condition that involves the loss of bone mass.

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**Key**

- █ Highly Trained (60 min of exercise a day)
- █ Moderately Trained (30 min of exercise a day)
- █ Untrained (sedentary)

**FIGURE 1.6** Regular exercise can reduce the natural decline in working capacity that occurs as we age.

physical activity (8). Similarly, compared to physically active women, sedentary women also have a higher risk of death (40, 41). These findings translate into a longer life span for people who exercise and have more active lifestyles. The primary factor for this increased longevity is that regular exercise lowers the risk of both heart attack and cancer (7, 8).

**Improved Psychological Well-Being** Strong evidence indicates that regular exercise improves psychological well-being in people of all ages. The mental health benefits of regular exercise include reduced risk for anxiety disorders and depression (42). Also, people report feeling less anxious and stressed after exercise, even up to eight hours afterward. These benefits lead to an improved sense of well-being in the physically active individual.

**SEE IT!****ABC Video**

Watch an ABC Video “Exercise May Build Brain Power!” at

**Mastering Health.**

**LO 3** **Make sure you know...**

- Regular physical activity and exercise reduce the risk of heart disease, diabetes, and certain types of cancer.
- Exercise increases bone mass in young people and strengthens bone in older adults.



Regular weight-bearing exercise can prevent loss of bone mass.

- Regular exercise maintains physical working capacity as a person ages, increases longevity, and improves quality of life.
- Exercise promotes psychological well-being and reduces risk of depressive and anxiety disorders.

## Exercise for Health-Related Fitness

**LO 4** Identify and discuss the five major components of health-related physical fitness.

Exercise training programs can be divided into two broad categories: *health-related physical fitness* and *skill-related physical fitness*. This book focuses on health-related fitness. The overall goal of a health-related physical fitness program is to optimize the quality of life (1, 42). The specific goals of this type of fitness program are to reduce the risk of disease and to improve total physical fitness. In contrast, the goal of sport- and skill-related fitness is to improve physical performance in a specific sport or activity.

Most exercise scientists agree that there are five major components of health-related physical fitness:

- Cardiorespiratory endurance
- Muscular strength



- Muscular endurance
- Flexibility
- Body composition

Some exercise scientists include motor skill performance as a sixth component. Motor skills are movement qualities such as agility and coordination. Although motor skills are important for sport performance, they are not directly linked to improving health in young adults and are therefore not considered a major component of health-related physical fitness. However, these motor skills may increase in importance as people age, because good balance, coordination, and agility help reduce the risk of falls in older adults.

## Cardiorespiratory Endurance

**Cardiorespiratory endurance** (sometimes called *aerobic fitness* or *cardiorespiratory fitness*) is often considered the key component of health-related physical fitness. It is a measure of the heart's ability to pump oxygen-rich blood to the working muscles during exercise and of the muscles' ability to take up and use the oxygen. Oxygen delivered to the muscles is used to produce the energy needed for prolonged exercise. In practical terms, cardiorespiratory endurance is the ability to perform exercises such as distance running, cycling, and swimming. Someone who has achieved a high level of cardiorespiratory endurance is generally capable of performing 30 to 60 minutes of vigorous exercise without undue fatigue.

## Muscular Strength

**Muscular strength** is measured by how much force a muscle or muscle group can generate during a single maximal contraction (how much weight an individual can lift during one maximal effort). Muscular strength is important in almost all sports. Even nonathletes require some degree of muscular strength to function in everyday life. Routine tasks such as lifting bags of groceries and moving furniture require muscular strength. Even modest amounts of resistance exercise can improve muscular strength.

## Muscular Endurance

**Muscular endurance** is the ability of a muscle to generate a submaximal force over and over again. Although muscular strength and muscular endurance are related, they are not the same. A person lifting a 150-pound barbell during one maximal muscular effort demonstrates high muscular strength. If he/she lifts a 25-pound barbell a dozen times, he/she demonstrates muscular endurance. As one develops muscular strength, endurance typically improves. However, muscular strength does not generally improve with endurance exercise training.

Most sports require muscular endurance. For instance, tennis players, who must run and repeatedly swing their



Regular physical activity can help you live longer.

racquets during a match, require a high level of muscular endurance. Many everyday activities (such as carrying your backpack all day) also require some level of muscular endurance.

## Flexibility

**Flexibility** is the ability to move joints freely through their full range of motion. Flexible individuals can bend and twist with ease. Without routine stretching, muscles and tendons shorten, reducing the range of motion around joints and impairing flexibility.

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**cardiorespiratory endurance** Measure of the heart's ability to pump oxygen-rich blood to the working muscles during exercise and of the muscles' ability to take up and use the oxygen.

**muscular strength** Maximal ability of a muscle to generate force.

**muscular endurance** Ability of a muscle to generate a submaximal force over and over again.

**flexibility** Ability to move joints freely through their full range of motion.

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