

Fitness and Wellness

Werner W.K. Hoeger • Sharon A. Hoeger
Amber Lee Fawson • Cherie I. Hoeger

13^e

13th
EDITION

Fitness & Wellness

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Fitness & Wellness, Inc.



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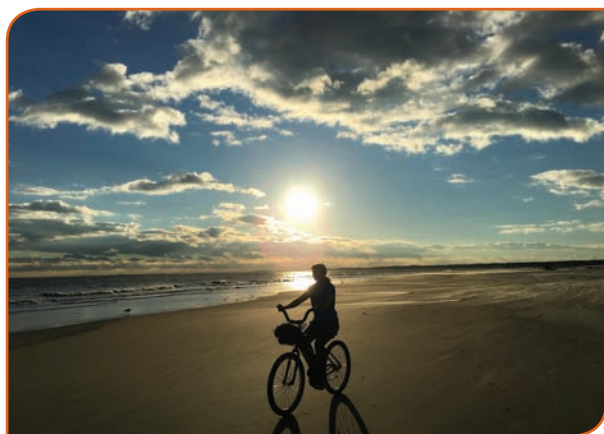
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Preface

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

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

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

Only about one-half of the adults in the United States meet the recommended amount of weekly aerobic physical activity, whereas less than a fourth meet the guidelines for muscular (strength) fitness. Among those who meet the guidelines, many do not reap the full benefits because they simply do not know how to implement and stay with a program that will yield the desired results.

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

A regular exercise program is as close as we get to the miracle pill that people look for to enjoy good health and quality of life over a now longer lifespan. Myriad benefits of exercise include enhanced functional

capacity; increased energy; weight loss; improved mood, self-esteem, and physical appearance; decreased risk for many chronic ailments, including obesity, cardiovascular disease, cancer, and diabetes; and a much lower risk for premature mortality. As stated as far back as 1982 in the prestigious *Journal of the American Medical Association*, "There is no drug in current or prospective use that holds as much promise for sustained health as a lifetime program of physical exercise."

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

What the Book Covers

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

- Understand the importance of good physical fitness and a wellness lifestyle in the achievement of good health and quality of life and a more productive and longer life.
- Determine whether medical clearance is needed for your safe participation in exercise.
- Learn behavior modification techniques to help you adhere to a lifetime fitness and wellness program.
- Assess the health-related components of fitness (cardiorespiratory endurance, muscular fitness [strength and endurance] muscular flexibility, and body composition).
- Write exercise prescriptions for cardiorespiratory endurance, muscular fitness, and muscular flexibility.
- Analyze your diet and learn the principles that govern sound nutrition.
- Develop sound diet and weight-management programs.

- Understand stress, lessen your vulnerability to stress, and implement a stress management program if necessary.
- Implement a cardiovascular disease risk-reduction program.
- Follow guidelines to reduce your personal risk of developing cancer.
- Implement a smoking cessation program, if applicable.
- Understand the health consequences of chemical dependency and irresponsible sexual behaviors and learn guidelines for preventing sexually transmitted infections.
- Discern between myths and facts of exercise and health-related concepts.

New in the Thirteenth Edition

All nine chapters in the 13th edition of *Fitness & Wellness* have been revised and updated according to recent advances published in the scientific literature and information reported at professional health, fitness, wellness, and sports medicine conferences. In addition to the chapter updates listed below, selected new figures and photographs are included in this edition. Note that the numbered reference notes for each chapter and Appendix E: Selective Nutrient Content of Common Foods have been made available in MindTap for this edition. Visit www.cengagebrain.com to access MindTap. The following are the most significant chapter updates:

Chapter 1, Introduction to Physical Fitness and Wellness

- A new section emphasizes the need to prevent disease.
- All statistics regarding disease risk, mortality, and healthcare costs in the United States and worldwide are updated.
- A new section on implementation intentions offers a practical tool for carrying out goal behavior.

Chapter 2, Assessment of Physical Fitness

- The cardiorespiratory endurance, muscular fitness, and flexibility assessments conform with the newly released 2018 Guidelines for Exercise Testing and Prescription by the American College of Sports Medicine (ACSM).
- Editorial changes were made throughout the chapter to update the various fitness assessment techniques.

- Expanded information on the benefits of flexibility and introductory information on factors that affect flexibility: joint structure, genetics, age, gender, and other factors.
- A new section explains the connection between body shape and risk for disease.

Chapter 3, Exercise Prescription

- The cardiorespiratory endurance, muscular fitness, and muscular flexibility exercise prescription principles are updated with the FITT-VP guidelines by the American College of Sports Medicine, including a more detailed explanation of the concepts of volume and progression of exercise training.

Chapter 4, Evaluating Fitness Activities

- New illustrations help define options for completing high-intensity interval training (HIIT).
- Two new sections explore the trends of Cross-Fit® and ultra-short workouts and give practical tips for students interested in trying these exercise modalities.
- Discussions of new fitness trends in areas including group exercise classes and mobility rollers.

Chapter 5, Nutrition for Wellness

- New information has been included on the carbohydrate-to-fiber ratio, high starch consumption, glycemic index and glycemic load, and benefits of nut consumption.
- Expanded information on the various types of unsaturated fatty acids is provided.
- The 2015–2020 Dietary Guidelines for Americans are included.

Chapter 6, Weight Management

- Updates to all statistics on the overweight and obesity problem in the United States are based on the latest data from the Centers for Disease Control and Prevention.
- Updates on the detrimental consequences of excessive body weight are provided.
- Additional information is provided on the misleading rule of thumb that to lose 1 pound of fat all a person has to do is produce a caloric deficit of 3,500 calories.
- The principle of *dynamic energy balance* and its role in the *energy-balancing* equation are introduced.

- The various-calorie diet plans (daily food logs) have been revised to emphasize the importance of sufficient protein intake throughout the day and minimize/eliminate the use of processed foods in the diet.
- There is an emphasis on the critical role of regular protein intake for adequate weight management.
- Foods that are most commonly associated with weight gain and weight loss are discussed, as well as the principle that “*a calorie may not always be a calorie.*”

Chapter 7, Stress Management

- A new figure details the real-time effects of the fight-or-flight mechanism on the body and the long-term physiological risks of repeated activation of this mechanism due to chronic stress.
- A new key term, *allostatic load*, is defined and explained in accordance with current research as the primary cause of disease vulnerability during the exhaustion stage of the general adaptation syndrome.
- Expanded information on the role of mindfulness meditation for stress management and the role adequate sleep plays in managing stress is explained.

Chapter 8, A Healthy Lifestyle Approach

- An update on the health benefits of spiritual wellness is provided.
- Information on the leading causes of death, including cardiovascular disease and cancer, in the United States is updated.
- Many updates are provided for the individual risk factors for cardiovascular disease, with greater emphasis on blood lipids, type 2 diabetes, and personal and family history.
- A new figure illustrates how cancer develops and spreads.
- Information on preventing cancer with diet has been updated with new guidelines, including those for processed meat and red meat intakes.

Chapter 9, Relevant Fitness and Wellness Issues

- Updates are provided to many of the most frequently discussed issues related to physical fitness and wellness, including but not limited to questions addressing behavioral change, sequence of aerobic and strength training, and potential detrimental consequences of excessive intense physical training in older adults.



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Additional Course Resources

- **Health MindTap for Fitness & Wellness.** MindTap is well beyond an eBook, a homework solution or digital supplement, a resource center website, a course delivery platform, or a Learning Management System. More than 70 percent of students surveyed said it was unlike anything they have seen before. MindTap is a personal learning experience that combines all your digital assets—readings, multimedia, activities, and assessments—into a singular learning path to improve student outcomes.
- **Diet & Wellness Plus.** The Diet & Wellness Plus App in MindTap helps you gain a better understanding of how nutrition relates to your personal health goals. It enables you to track your diet and activity, generate

reports, and analyze the nutritional value of the food you eat! It includes over 55,000 foods in the database, custom food and recipe features, and the latest dietary references, as well as your goal and actual percentages of essential nutrients, vitamins, and minerals. It also helps you to identify a problem behavior and make a positive change. After completing the Wellness Profile Questionnaire, Diet & Wellness Plus will rate the level of concern for eight different areas of wellness, helping you determine the areas where you are most at risk. It then helps you put together a plan for positive change by helping you select a goal to work toward—complete with a reward for all your hard work.

- **Instructor Companion Site.** Everything you need for your course in one place! This collection of book-specific lecture and class tools is available online via <http://www.cengage.com/login>. Access and download PowerPoint presentations, images, instructor's manual, videos, and more.
- **Cengage Learning Testing Powered by Cognero.** Cengage Learning Testing Powered by Cognero is a flexible, online system that allows you to do the following:
 - Author, edit, and manage test bank content from multiple Cengage Learning solutions.
 - Create multiple test versions in an instant.
 - Deliver tests from your LMS, your classroom, or wherever you want.

Acknowledgments

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Brief Author Biographies

Werner W. K. Hoeger is a professor emeritus of the Department of Kinesiology at Boise State University, where he taught between 1986 and 2009. He had previously taught at the University of the Andes in Venezuela (1978–1982); served as Technical Director of the Fitness Monitoring Preventive Medicine Clinic in Rolling Meadows, Illinois (1982–1983); The University of Texas



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of the Permian Basin in Odessa, Texas (1983–1986); and briefly taught for one semester in 2012, 2013, and 2016 as an adjunct faculty at Brigham Young University–Hawaii in Laie, Hawaii. He remains active in research and continues to lecture in the areas of exercise physiology, physical fitness, health, and wellness.

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

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

Using his knowledge and personal experiences, Dr. Hoeger writes engaging, informative books that thoroughly address today's fitness and wellness issues in a format accessible to students. Since 1990, he has been the most widely read fitness and wellness college textbook author in the United States. He has published a

total of 63 editions of his nine fitness and wellness-related titles. Among the textbooks written for Wadsworth/Cengage Learning are *Principles and Labs for Fitness and Wellness: A Personalized Program*, 14th edition; *Lifetime Physical Fitness & Wellness*, 15th edition; *Fitness & Wellness*, 13th edition; *Principles and Labs for Physical Fitness*, 10th edition; *Wellness: Guidelines for a Healthy Lifestyle*, 4th edition; and *Water Aerobics for Fitness & Wellness*, 4th edition (with Terry-Ann Spitzer Gibson).

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

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

Proving that he “practices what he preaches,” he was the oldest male competitor in the 2002 Winter Olympics in Salt Lake City, Utah, at the age of 48. He raced in the sport of luge along with his then 17-year-old son

Christopher. It was the first, and so far only time, in Winter Olympics history that father and son competed in the same event. In 2006, at the age of 52, he was the oldest competitor at the Winter Olympics in Turin, Italy. At different times and in different distances (800 m, 1,500 m, and the mile) in 2012, 2014, 2015, and 2016, Dr. Hoeger reached All-American standards for his age group by USA Track and Field (USATF). In 2015, he finished third in the one-mile run at the USATF Masters Indoor Track and Field National Championships, and third and fourth, respectively, in the 800- and 1,500-meter events at the Outdoor National Senior Games. In 2016, he advanced to the finals in both the 800 m and the 1,500 m at the World Masters Track and Field Championships held in Perth, Australia. He finished seventh (out of 12 finalists) in the 800 m and eighth (out of 16 finalists) in the 1,500 m.

Sharon A. Hoeger is Vice-President of Fitness & Wellness, Inc. of Boise, Idaho. Sharon received her degree in computer science from Brigham Young University. She is extensively involved in the research process used in retrieving the most current scientific information that goes into the revision of each textbook. She is also the author of the software written specifically for the fitness and wellness textbooks. Her innovations in this area since the publication of the first edition of *Lifetime Physical Fitness & Wellness* set the standard for fitness and wellness computer software used in this market today.



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Sharon is a co-author in five of the seven fitness and wellness titles. She also served as Chef de Mission (Chief of Delegation) for the Venezuelan Olympic Team at the 2006 Olympic Winter Games in Turin, Italy. Husband and wife have been jogging and strength training together for more than 41 years. They are the proud parents of five children, all of whom are involved in sports and lifetime fitness activities. Their motto: “Families that exercise together, stay together.”

Amber L. Fawson and Cherie I. Hoeger received their degrees in English with an emphasis in editing for publication. For the past 17 years Amber has enjoyed working in the publication industry and has held positions as an Editorial Coordinator for *BYU Studies*, Assistant Editor for Cengage Learning, and freelance writer and editor for tertiary education textbooks and workbooks. During the last decade, Cherie has been working as a

freelance writer and editor; writing research and marketing copy for client magazines, newsletters, and websites; and contracting as a textbook copy editor for Cengage Learning (previously under Thomson Learning and the Brooks/Cole brand).

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



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Introduction to Physical Fitness and Wellness

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

Objectives

- 1.1 Understand** the importance of lifetime fitness and wellness.
- 1.2 Learn** the recommended guidelines for weekly physical activity.
- 1.3 Define** physical fitness and list components of health-related and skill-related fitness.
- 1.4 Understand** the benefits of a comprehensive fitness and wellness program.
- 1.5 Learn** motivational and behavior modification techniques to enhance compliance with a healthy lifestyle program.
- 1.6 Learn** to write SMART goals to aid with the process of change.
- 1.7 Determine** whether medical clearance is required for safe participation in exercise.

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REAL LIFE STORY | Jordan's Experience

Last year as a freshman in college, I was advised to enroll in a general ed fitness and wellness course. I played high school sports and thought I knew all there was to know about being fit and in shape. As the course started, I realized I didn't really know how important it was to exercise regularly and take good care of myself. It quickly became my favorite class, and I couldn't wait to try what I was learning. I started cardio and

strength workouts according to an exercise prescription I wrote myself. I didn't even know there was such a thing as an "exercise prescription." I even stretched once in a while and started to eat better. As I became more fit, I started to feel better about myself, I lost weight,



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I toned up, I had so much more energy, and I actually started to enjoy exercise. It is fun to work out! I now know that how well I will live the rest of my life has a lot to do with wellness choices I make. My goal is to never stop exercising and take good care of myself.

Most people believe school will teach them how to make a better living. A fitness and wellness course will teach you how to live better—how to truly live your life to its fullest potential. Real success is about more than money: Making a good living will not help you unless you live a wellness lifestyle that will allow you to enjoy what you have. Your lifestyle is the most important factor affecting your personal well-being, but most people don't know how to make the right choices to live their best life.

The benefits of an active and healthy lifestyle have been clearly substantiated by scientific evidence linking increased physical activity and positive habits to better fitness, health, and improved quality of life. Even though a few individuals live long because of favorable genetic factors, for most people, the quality of life during

middle age and the "golden years" is more often related to wise choices initiated during youth and continued throughout life.

Unfortunately, the current way of life in most developed nations does not provide the human body with sufficient physical activity to maintain adequate health. Furthermore, many lifestyle patterns are such a serious threat to health that they actually speed up deterioration of the human body. In a few short years, lack of wellness leads to loss of vitality and gusto for life, as well as premature morbidity and mortality.

Even though most people in the United States believe a positive lifestyle has a great impact on health and longevity, most do not know how to implement a fitness and wellness program that will yield the desired results. Patty Neavill is an example of someone who frequently tried to



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

change her life but was unable to do so because she did not know how to implement a sound exercise and weight control program. At age 24, Patty, a college sophomore, was discouraged with her weight, level of fitness, self-image, and quality of life in general.

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

Following the initial fitness assessment, Patty met with her course instructor, who prescribed an exercise and nutrition program such as the one presented in this book. Patty fully committed to carry out the prescription. She walked or jogged five times a week, worked out with weights twice a week, and played volleyball or basketball two to four times each week. Her daily caloric intake was set in the range of 1,500 to 1,700 calories. She took care to meet the minimum required amounts from the basic food groups each day, which contributed about 1,200 calories to her diet. The remainder of the calories came primarily from complex carbohydrates. By the end of the 16-week semester, Patty's cardiorespiratory fitness, strength, and flexibility ratings all had improved to the "good" category, she had lost 50 pounds, and her percent body fat had dropped to 22.5!

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

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

Thank you, your trim Patty!

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

Of even greater significance, Patty maintained her aerobic and strength-training programs. A year after ending her calorie-restricted diet, her weight actually increased by 10 pounds—but her body fat decreased from 22.5 percent to 21.2 percent. As discussed in Chapter 6, the weight increase was related mostly to changes

in lean tissue lost during the weight-reduction phase. Despite only a slight drop in weight during the second year following the calorie-restricted diet, Patty's 2-year follow-up revealed a further decrease in body fat, to 19.5 percent. Patty understands the new quality of life reaped through a sound fitness program.

1.1 Lifestyle, Health, and Quality of Life

Research findings have shown that physical inactivity and negative lifestyle habits pose a serious threat to health. Movement is a basic function for which the human body was created. But advances in technology have almost completely eliminated the necessity for physical exertion in daily life. Most nations, both developed and developing, are experiencing an epidemic of physical inactivity.

Today we live in an automated society. Most of the activities that used to require strenuous physical exertion can be accomplished by machines with the simple push of a button. We grow up in communities that lack sidewalks, bike lanes, or amenities that are near enough to walk to. We go about life being transported by car, and we are driven walkable distances to save time, to avoid unpleasant weather, or to keep clothes and appearance pristine. We may not own weather-protective clothes because we go from home to car to school or work. During a visit to a multilevel shopping mall, nearly everyone chooses to ride the escalators instead of taking the stairs.

With the developments in technology, three additional factors have changed our lives significantly and have had a negative effect on human health: nutrition, stress, and environment. Fatty foods, sweets, alcohol, tobacco, excessive stress, and environmental hazards have detrimental effects on people's health.

One of the most significant detrimental effects of modern-day technology has been an increase in **chronic diseases** related to a lack of physical activity. These include hypertension (high blood pressure), heart disease, diabetes, chronic low back pain, and obesity, among others. They sometimes are referred to as **hypokinetic diseases**. (*Hypo* means low or little, and *kinetic* implies motion.)

GLOSSARY

Chronic diseases

Illnesses that develop and last over a long time.

Hypokinetic diseases

Diseases related to a lack of physical activity.



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

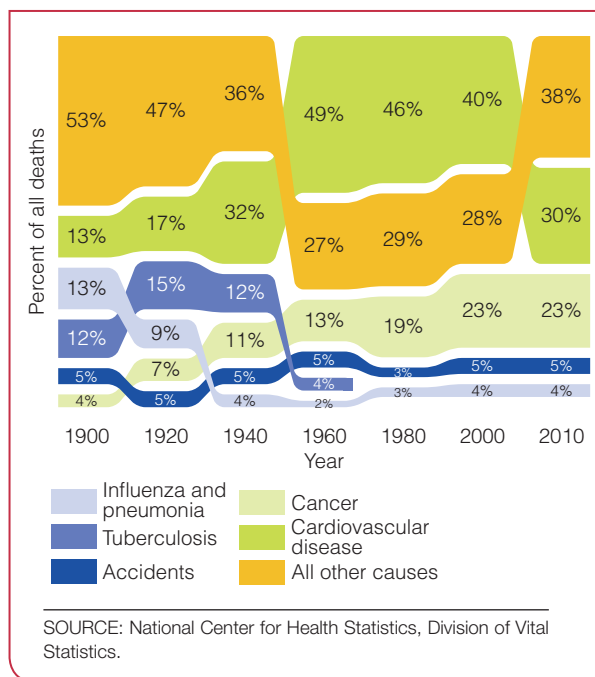
In the United States, physical inactivity is the second greatest threat to public health (after tobacco use) and is often referenced in new concerns about *sitting disease* and **sedentary death syndrome (SeDS)**. According to the World Health Organization (WHO), chronic diseases account for 60 percent of all deaths worldwide.¹ If we want to enjoy contemporary commodities and still expect to live life to its fullest, a personalized lifetime exercise program must become a part of our daily lives.

The leading causes of death in the United States today are lifestyle-related (see Figure 1.1). About 48 percent of all deaths in the United States are caused by cardiovascular disease and cancer.² Almost 80 percent of these deaths could be prevented by adhering to a healthy lifestyle. The third and fourth leading causes of death across all age groups, respectively, are chronic lower respiratory disease and accidents. From the ages of 1 to 44, accidents are the leading cause of death, with automobile accidents being the leading cause of death in the 5-to-24 age group.³

Even though not all accidents are preventable, many are. Consider automobile accidents, the leading cause of death for teens. Across the United States, fewer than 15 percent of people taking trips in automobiles choose not to wear seatbelts, yet these people account for half of all automobile deaths. As for the cause of automobile accidents themselves, fatal accidents are often related to failure to stay in the correct lane or yield the right of way due to driver distraction or alcohol use.⁴

Based on estimates, more than half of disease is lifestyle related, a fifth is attributed to the environment,

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



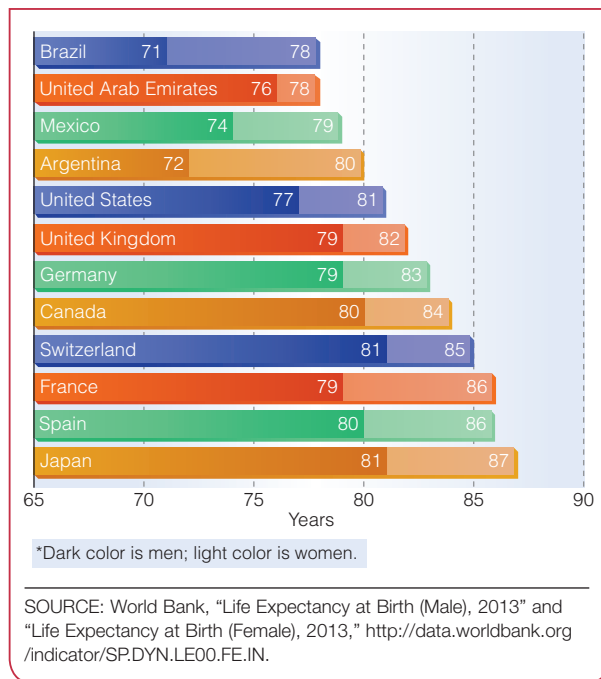
and a tenth is influenced by the health care the individual receives. Only 16 percent is related to genetic factors. Thus, the individual controls as much as 80 percent of his or her vulnerability to disease—and consequently quality of life. In essence, most people in the United States are threatened by the very lives they lead today.

1.2 Life Expectancy

Currently, the average life expectancy in the United States is 78.9 years (76.6 years for men and 81.4 years for women).⁵ In the past decade alone, life expectancy has increased by over 1 year—the news, however, is not all good. The data show that people now spend an extra 1.2 years with a serious illness and an extra 2 years of disability.

While the United States was once a world leader in life expectancy, over recent years, the increase in life expectancy in the United States has not kept pace with that of other developed countries. Based on data from the World Health Organization (WHO), the United States ranks thirty-first in the world for life expectancy (see Figure 1.2).⁶ Japan ranks first in the world with an overall life expectancy of 83.7 years.⁷

Figure 1.2 Life expectancy at birth for selected countries: 2005–2015 projections.*



The Need to Prevent Disease, Not Only Cure It

The United States has not invested the same resources in preventing disease as it has in treating disease after onset. Ninety-five percent of our health care dollars are spent on treatment strategies, and less than 5 percent are spent on prevention. The latest data indicate that one in four adults in the United States has at least two chronic conditions. This trend has alarmed health officials, as the burden on a patient with multiple conditions is greater than the sum of the individual diseases.

A report by the Organisation for Economic Cooperation and Development (OECD) found that while the United States far outspent every other country in health care costs per capita, it also easily had the highest rates of obesity of all 34 OECD countries.⁸ As a nation, we are seeing the consequences of these numbers unfold. Incidence of diabetes climbed dramatically in parallel step with the increased incidence of obesity.⁹ Today, nearly half of the people in the United States have diabetes or prediabetes, but the rising U.S. diabetes rates have begun to plateau, as obesity rates have done the same.¹⁰

In terms of yearly health care costs per person, the United States ranks in the top three of OECD countries. Per capita U.S. health care costs are about 2.5 times the OECD average. An estimated 5 percent of the people account for 50 percent of health care costs.¹¹

1.3 Physical Activity Affects Health and Quality of Life

Among the benefits of regular physical activity and exercise are a significant reduction in premature mortality and decreased risks for developing heart disease, stroke, metabolic syndrome, type 2 diabetes, obesity, osteoporosis, colon and breast cancers, high blood pressure, depression, and even dementia and Alzheimer's.¹² Regular physical activity also is important for the health of muscles, bones, and joints, and has been shown in clinical studies to improve mood, cognitive function, creativity, and short-term memory and enhance one's ability to perform daily tasks throughout life. It also can have a major impact on health care costs and helps maintain a high quality of life into old age.

Physical Activity and Exercise Defined

Abundant scientific research over the past three decades has established a distinction between physical activity and exercise. **Exercise** is a type of activity that requires planned, structured, and repetitive bodily movement to improve or maintain one or more components of physical fitness. Examples of exercise are walking, running, cycling, doing aerobics, swimming, and strength training. Exercise is usually viewed as an activity that requires a vigorous-intensity effort.

Physical activity is bodily movement produced by skeletal muscles. It requires energy expenditure and produces progressive health benefits. Physical activity can be of light intensity or moderate to vigorous intensity. Examples of daily **light physical activity** include walking to and from work, taking the stairs instead of elevators and escalators, grocery shopping, and doing

GLOSSARY

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

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

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

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

household chores. Physical inactivity, by contrast, implies a level of activity that is lower than that required to maintain good health.

Extremely light expenditures of energy throughout the day used to walk casually, perform self-care, or do other light work like emptying a dishwasher are of far greater significance in our overall health than we once realized. We now understand the impact of accumulating constant/small movements. Every movement conducted throughout the day matters.

To better understand the impact of all intensities of physical activity, scientists created a new category of movement called **nonexercise activity thermogenesis (NEAT)**.¹³ Any energy expenditure that does not come from basic ongoing body functions (such as digesting food) or planned exercise is categorized as NEAT. A person, on an average day, may expend 1,300 calories simply maintaining vital body functions (the basal metabolic rate) and 200 calories digesting food (thermic effect of food). Any additional energy expended during the day is expended either through exercise or NEAT. For an active person, NEAT accounts for a major portion of energy expended each day. Though it may not increase cardiorespiratory fitness as moderate or vigorous exercise will, NEAT can easily use more calories in a day than a planned exercise session. As a result, NEAT is extremely critical for keeping daily energy balance in check. Especially when beginning or intensifying an exercise program, some individuals tend to adjust other activities of daily living, so they sit more and move less

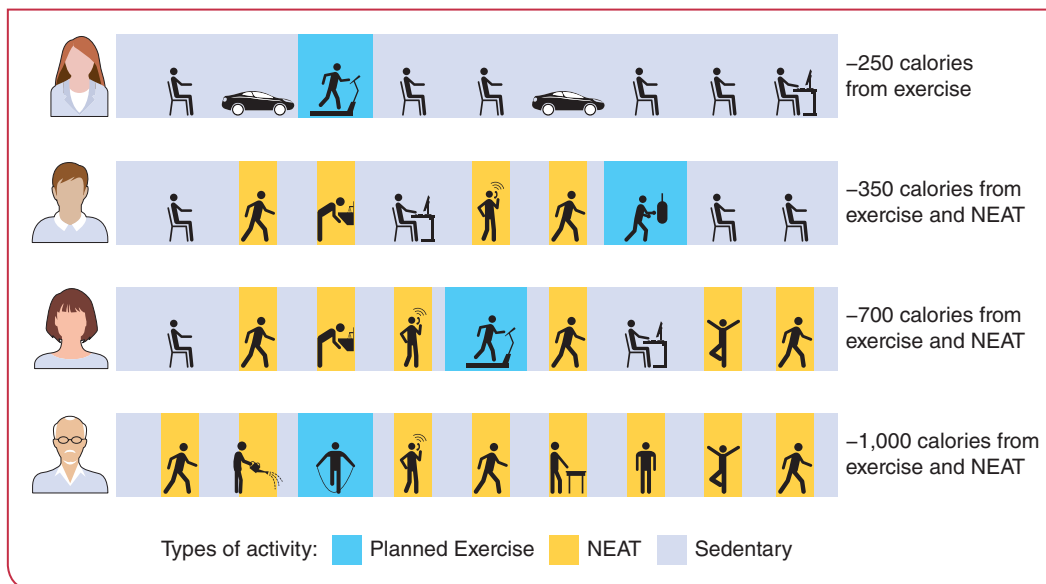
during the remainder of the day. This self-defeating behavior can lead to frustration that exercise is not providing the weight management benefits it should. It is important to keep daily NEAT levels up regardless of exercise levels.

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

A person with a desk job who has the option to stand and move about throughout the day will expend 300 more calories a day than a person who sits at the desk most of the day (see Figure 1.3). People who spend most of the day working on their feet, such as a medical assistant or a stay-at-home parent, expend 700 daily calories more than a person with a sedentary desk job. People with physically demanding jobs, such as construction workers, can easily burn 1,600 daily calories more than a sedentary worker.¹⁴

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

Figure 1.3 The importance of nonexercise activity thermogenesis (NEAT) and exercise.



Regular **moderate physical activity** provides substantial benefits in health and well-being for the vast majority of people who are not physically active. For those who are already moderately active, even greater health benefits can be achieved by increasing the level of physical activity. Examples of moderate physical activity are brisk walking or cycling, playing basketball or volleyball, recreational swimming, dancing fast, pushing a stroller, raking leaves, shoveling snow, and gardening.

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

1.4 Federal Guidelines for Physical Activity

Because of the importance of physical activity to our health, the U.S. Department of Health and Human Services issued *Physical Activity Guidelines for Americans*.¹⁵

Adults Between 18 and 64 Years of Age

- Adults should do 150 minutes a week of moderate-intensity aerobic (cardio-respiratory) physical activity, 75 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity (also see Chapter 3). When combining moderate- and vigorous-intensity activities, a person could participate in moderate-intensity activity twice a week for 30 minutes and high-intensity activity for 20 minutes on another 2 days. Aerobic activity should be performed in episodes of at least 10 minutes long each, preferably spread throughout the week.
- *Additional health benefits* are provided by increasing to 5 hours (300 minutes) a week of moderate-intensity aerobic physical activity, 2 hours and 30 minutes a week of vigorous-intensity physical activity, or an equivalent combination of both.
- Adults should also do muscle-strengthening activities that involve all major muscle groups, performed on 2 or more days per week.

Older Adults (Ages 65 and Older)

- Older adults should follow the adult guidelines. If this is not possible due to limiting chronic

conditions, older adults should be as physically active as their abilities allow. They should avoid inactivity. Older adults should do exercises that maintain or improve balance if they are at risk of falling.

Children 6 Years of Age and Older and Adolescents

- Children and adolescents should do 1 hour (60 minutes) or more of physical activity every day.
- Most of the 1 hour or more a day should be either moderate- or vigorous-intensity aerobic physical activity.
- As part of their daily physical activity, children and adolescents should do vigorous-intensity activity on at least 3 days per week. They also should do muscle-strengthening and bone-strengthening activities on at least 3 days per week.

Pregnant and Postpartum Women

- Healthy women who are not already doing vigorous-intensity physical activity should get at least 2 hours and 30 minutes (150 minutes) of moderate-intensity aerobic activity a week. Preferably, this activity should be spread throughout the week. Women who regularly engage in vigorous-intensity aerobic activity or high amounts of activity can continue their activity provided that their condition remains unchanged and they talk to their health care provider about their activity level throughout their pregnancy.

The guidelines state that some adults should be able to achieve calorie balance with 150 minutes of moderate physical activity in a week, while others will find they need more than 300 minutes per week.¹⁶ This recommendation is based on evidence indicating that people who maintain healthy weight typically accumulate 1 hour of daily physical activity.¹⁷ Between 60 and 90 minutes of moderate-intensity physical activity daily is recommended to sustain weight loss for previously

GLOSSARY

Nonexercise activity thermogenesis (NEAT) Energy expended doing everyday activities not related to exercise.	that causes rapid breathing and a substantial increase in heart rate.
Vigorous physical activity An activity similar to jogging	Moderate physical activity Activity that uses 150 calories of energy per day, or 1,000 calories per week.

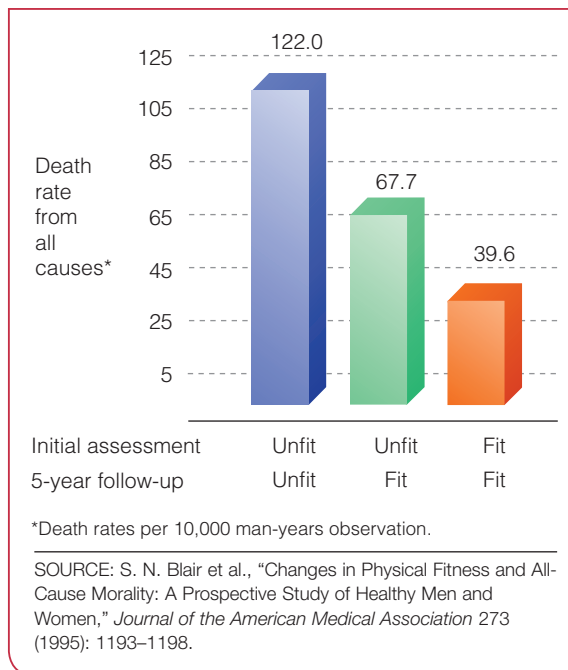
overweight people.¹⁸ And 60 to 90 minutes of activity per day provides additional health benefits.

1.5 Benefits of Physical Fitness

The benefits to be enjoyed from participating in a regular fitness program are many. In addition to a longer life (see Figures 1.4 and 1.5), the greatest benefit of all is that physically fit people who lead a positive lifestyle have a healthier and better quality of life. These people live life to its fullest and have fewer health problems than inactive individuals who also indulge in negative lifestyle habits. Compiling an all-inclusive list of the benefits to be reaped through participation in a fitness program is a challenge, but the list provided in Table 1.1 summarizes many of these benefits.

In addition to the benefits listed in Table 1.1, **epidemiological** research studies linking physical activity habits and mortality rates have shown lower premature mortality rates in physically active people. Pioneer work in this area demonstrated that, as the amount of weekly physical activity increased, the risk of cardiovascular deaths decreased.¹⁹ In this study, conducted among 16,936 Harvard alumni, the greatest decrease in cardiovascular deaths was observed in alumni who burned more than 2,000 calories per week through physical activity.

Figure 1.5 Effects of fitness changes on mortality rates.



A landmark study subsequently upheld the findings of the Harvard alumni study.²⁰ Based on data from 13,344 individuals who were followed over an average of 8 years, the results confirmed that the level of cardiorespiratory

Figure 1.4 Death rates by physical fitness levels.

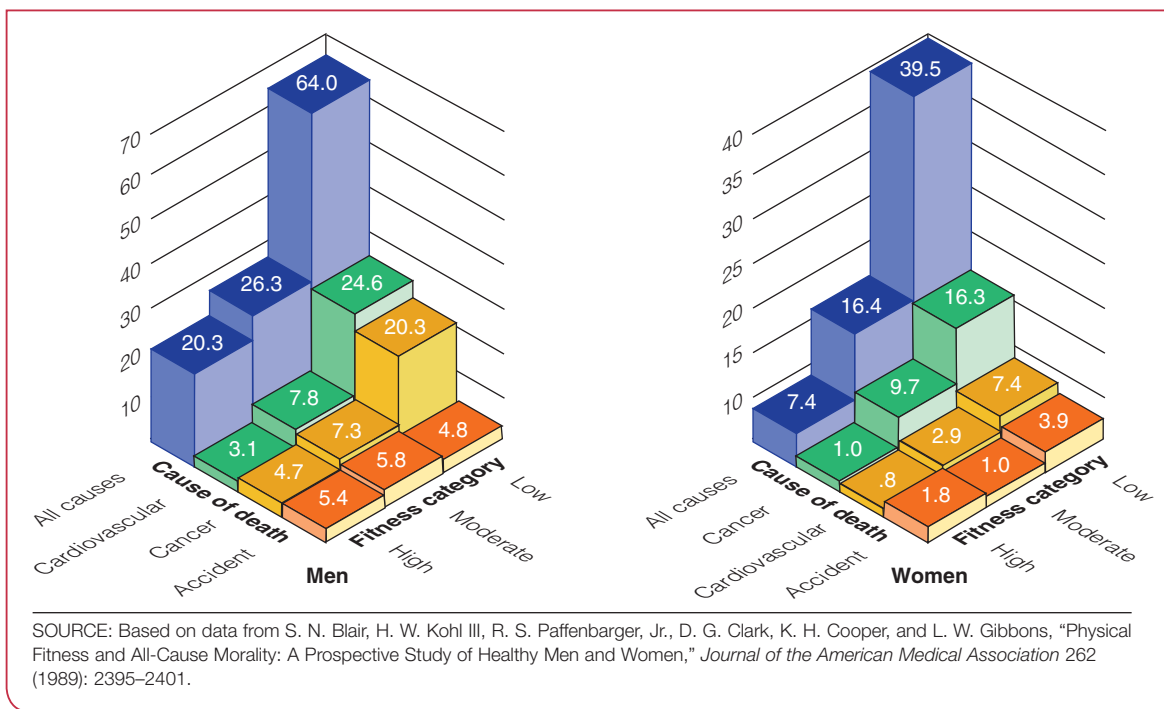


Table 1.1 Long-Term (Chronic) Benefits of Exercise

Regular participation in exercise

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

fitness is related to mortality from all causes. These findings showed a graded and consistent inverse relationship between physical fitness and mortality, regardless of age and other risk factors.

In essence, the higher the level of cardiorespiratory fitness, the longer the life (see Figure 1.4). The death rate from all causes for the low-fit men was 3.4 times higher than for the high-fit men. For the low-fit women, the death rate was 4.6 times higher than for the high-fit women. The study also reported a greatly reduced rate of premature deaths, even at moderate fitness levels, which most adults can achieve easily. People gain further protection when they combine higher fitness levels with reduction in other risk factors such as hypertension, elevated cholesterol, cigarette smoking, and excessive body fat.

Additional research that looked at changes in fitness and mortality found a substantial (44 percent) reduction

in mortality risk when the study participants abandoned a sedentary lifestyle and became moderately fit (see Figure 1.5).²¹ The lowest death rate was found in people who were fit and remained fit, and the highest rate was found in men who remained unfit.

One study looked to specifically compare the efficacy of commonly prescribed drugs against the impact of regular exercise. The data are based on more than 14,000 patients recovering from stroke, being treated for heart failure, or looking to prevent type 2 diabetes or a second episode of coronary heart disease. The study looked at the effectiveness of exercise versus drugs on health

GLOSSARY

Epidemiological Of the study of epidemic diseases.