

PRINCIPLES AND LABS FOR

PHYSICAL FITNESS



WERNER W. K. HOEGER

SHARON A. HOEGER

10E



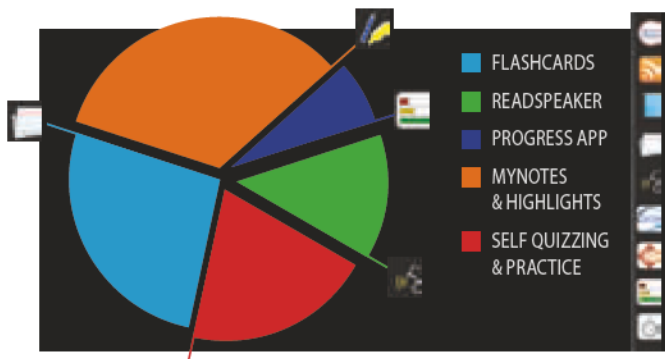
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TENTH EDITION

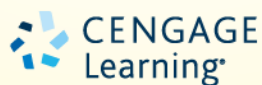
PRINCIPLES AND LABS FOR

physical fitness

TENTH EDITION

Werner W.K. Hoeger
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Sharon A. Hoeger
Fitness & Wellness, Inc.



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Preface

People go to college to learn how to make a living. Making a good living, however, won't help unless people live an active lifestyle that allows them to enjoy what they have. The American way of life does not provide the human body with sufficient physical activity to maintain adequate health. Many present lifestyle patterns are such a serious threat to our health that they actually increase the deterioration rate of the human body and often lead to premature illness and mortality.

Furthermore, the science of behavioral therapy has established that many of the behaviors we adopt are a product of our environment. Unfortunately, we live in a “toxic” health and fitness environment. Becoming aware of how the environment affects our health is vital if we wish to achieve and maintain wellness. Yet, we are so habituated to this modern-day environment that we miss the subtle ways in which it influences our behaviors, personal lifestyle, and health each day.

Research clearly indicates that people who lead an active lifestyle live longer and enjoy a better quality of life. As a result, the importance of sound fitness and wellness programs has assumed an entirely new dimension. The Office of the Surgeon General has identified physical fitness as a top health priority by stating that the nation's top health goals in the 21st century are exercise, increased consumption of fruits and vegetables, smoking cessation, and the practice of safe sex. All four of these fundamental healthy lifestyle factors are thoroughly addressed in this book.

Because of the impressive scientific evidence supporting the benefits of physical activity, most people in this country are aware that physical fitness promotes a healthier, happier, and more productive life. Nevertheless, the vast majority of Americans do not enjoy a better quality of life because they either are led astray by a multibillion-dollar “quick fix” industry or simply do not know how to implement a sound physical activity program that yields positive results. Only in a fitness course do people learn sound principles of healthy lifestyle factors, including exercise prescriptions that, if implemented, teach them how to truly live life to its fullest potential.

Principles and Labs for Physical Fitness contains 11 chapters and 35 laboratories that serve as guides to implement a comprehensive lifetime fitness program. This edition has been updated to include the latest information reported in the literature and at professional health, physical education, and sports medicine meetings. You are encouraged to be physically active, adhere to a well-balanced diet, and lead a healthy lifestyle to achieve wellness. To promote this, the

book includes information on motivation and behavioral modification techniques that help you eliminate negative behaviors and implement a healthier way of life.

The emphasis throughout the book is on teaching you how to take control of your fitness and lifestyle habits so that you can make a deliberate effort to stay healthy and achieve the highest potential for well-being.

New in the Tenth Edition

This new edition of *Principles and Labs for Physical Fitness* has been revised and updated to conform to advances in the field and new recommendations by major national health and fitness organizations. New content is based on information reported in literature and at professional health, physical education, exercise science, and sports medicine meetings.

In this edition, we continue to provide the MyProfile feature at the beginning of each chapter for students to evaluate their current knowledge of the chapter's topic. Included also are the Confident Consumer and Diversity Considerations boxes to help students make healthier choices and be discerning fitness and wellness consumers. These features, along with the Real Life Story and FAQ sections, are intended to perk the students' interest in the chapter contents. Beyond the individual chapter updates listed in the next section, new figures and photography are included throughout the textbook.

Chapter Updates

- All statistics related to the leading causes of death, life expectancy, and health care costs and prevalence of physical activity in the United States have been brought up-to-date in the opening chapter, “Why Physical Fitness?” New sections on the *Nagano Lifestyle Experience*, *Adopting Healthy Habits at a Young Age*, and *Sitting Disease*, a 21st century ailment coined by the scientific community to explain the detrimental effects of excessive sitting on health and wellness have been added to this chapter. Information is also presented on recommendations for daily lifestyle changes to minimize the risk for “sitting disease.” The section on *Exercise and Brain Function* has been updated and enhanced and provides new information on the role of exercise in the prevention of mental decline and Alzheimer's disease.
- Chapter 2, “Behavior Modification,” includes a new section on *Values and Behavior* that explains the way core values are formed, with new information on the role of the prefrontal cortex of the brain in carrying out value-

centered behavior. The section about the brain and habit formation has been updated and expanded, and new content introduces mindfulness, willpower, and examines the way these affect goal achievement. All statistics regarding the negative effects of a sedentary lifestyle and our food-abundant environment have been updated, and new information on the effect of social norms on behavior has also been added to the chapter. A new figure on SMART goals has also been added.

- The topic of Chapter 3, “Nutrition for Wellness,” was updated and revised to include new information on the health consequences of excessive sugar intake, sugar-sweetened beverages, and energy drinks. Additional information is provided on unsaturated fatty acids (including omega-9s); olive oil and canola oil; the key role of adequate protein intake throughout the day; complementary proteins for vegetarian diets; red-meat intake, chronic disease, and premature death; the Harvard Healthy Eating Plate; and the latest advances for the prevention and treatment of osteoporosis. Many other minor updates as related to nutrition principles were made to the chapter.
- New global recommendations for health metrics have been added to Chapter 4, “Body Composition,” including a discussion of the way waist circumference, waist-to-height-ratio (WHtR), and the Body Mass Index are being used in conjunction to prevent disease. The potential of WHtR to more accurately predict disease and to be used in public health education is discussed. Data and figures for the different obesity classes (I, II, and III) were also included.
- Important changes related to the recommendations and advances in the field of weight control are discussed in Chapter 5, “Weight Management.” The data on the obesity epidemic in the United States were brought up-to-date and include obesity prevalence estimates based on gender, level of education, and cultural ethnicity. EDNOS (Eating Disorders Not Otherwise Specified) and the Federal Trade Commission’s Weight-Loss Gimmick “7 Gut Check Claims” are included in the chapter. Enhancements were also made to the *Physiology of Weight Loss* and *Weight Loss Strategies* sections, including a better explanation on the rule of thumb that one pound of fat represents 3,500 calories; a new section on the *Overweight and Fit Debate* (fit and fat); the value of having three regular meals and two healthy snacks daily; the importance of adequate amount of lean protein sources with each meal; and the benefits of exercise-intensity, interval training, and the effects of cold-water swimming on weight loss.
- The “Cardiorespiratory Endurance” chapter (Chapter 6) includes updates on the number of people who meet the 2008 Federal Guidelines for Physical Activity. Additional information on energy drinks, the new FITT-VP acronym used for exercise prescription, “physical stillness,” the importance of maintaining some physical activity throughout the day, exercise volume, and fitness apps are all addressed in this chapter.
- The title of Chapter 7 has been changed to “Muscular Fitness,” a new term that describes the general health, strength, and endurance of a person’s muscular system. Updates were also made to the *Strength Training Benefits* section, aging and sarcopenia (loss of muscle mass), effects of aging on visceral fat, free weights versus strength-training machines, dietary protein guidelines for strength development, exercise safety guidelines, and an introduction to the concepts of myofibrillar and plasmic hypertrophy.
- In Chapter 8, “Muscular Flexibility,” the section on preventing and rehabilitating low back pain has been expanded to include information on the importance of core-strengthening exercise to strengthen muscles that stabilize the spine. New studies are cited, emphasizing the benefit of exercise therapy over bed rest as a treatment for chronic back pain, including data supporting yoga as effective for reducing pain and improving function. Also added to the chapter was a new figure listing ergonomic tips to improve the computer workspace, provide optimal lower back support, and ensure correct sitting posture while working at a desk.
- In Chapter 9, “Skill Fitness and Fitness Programming,” all information regarding 2014 fitness trends has been brought up to date and incorporates new discussions on various activities, including functional fitness, bike commuting and outdoor training, the Tabata high-intensity training program, the reemergence of high-intensity circuit training (HICT), and senior fitness solutions incorporating Tai Chi.
- Information on the importance of proper breathing as a natural mechanism to reduce stress has been added to Chapter 10, “Stress Assessment and Management Techniques.” The benefits of mindfulness meditation, Tai Chi, and yoga for stress management have also been expanded in this edition.
- Chapter 11, “A Healthy Lifestyle,” contains updates on lifestyle-related factors that contribute to premature mortality, including the major risk factors for coronary heart disease and cancer. New information is provided on warning signs for stroke, ECG recommendations, and the new heart disease and stroke prevention guidelines by the American Heart Association and the American College of Cardiology. The content on illegal drugs, alcohol abuse, and sexually transmitted infections in the United States, as well as the guidelines for choosing a personal fitness trainer, have all been brought up-to-date in the chapter.

Ancillaries

Health MindTap for *Principles and Labs for Physical Fitness* with Instant Access Code.
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MindTap is well beyond an eBook, a homework solution or digital supplement, a resource center website, a course deliv-

ery platform, or a Learning Management System. More than 70% of students surveyed said that it was unlike anything they have ever seen before. MindTap is a new personal learning experience that combines all of your digital assets—readings, multimedia, activities, and assessments—into a singular learning path to improve student outcomes.

Diet & Wellness Plus

Diet & Wellness Plus 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, the latest Dietary References, as well as your goal and actual percentages of essential nutrients, vitamins, and minerals. It also helps you to identify a problem behavior and make a positive change. After completing a Wellness Profile questionnaire, Diet & Wellness Plus will rate the level of concern for 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. Diet & Wellness Plus is also available as an App that can be accessed from the App dock in MindTap and can be used throughout the course for students to track their diet and activity and behavior change.

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Brief Author Biographies

Werner W.K. Hoeger is a professor emeritus of the Department of Kinesiology at Boise State University. He remains active in research and continues to lecture in the areas of exercise physiology, physical fitness, 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 of the Research Consortium of the Society of Health and Physical Educators (SHAPE America—previously the American Alliance for Health, Physical Education, Recreation, and Dance). 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 seventh Ibero-American 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.

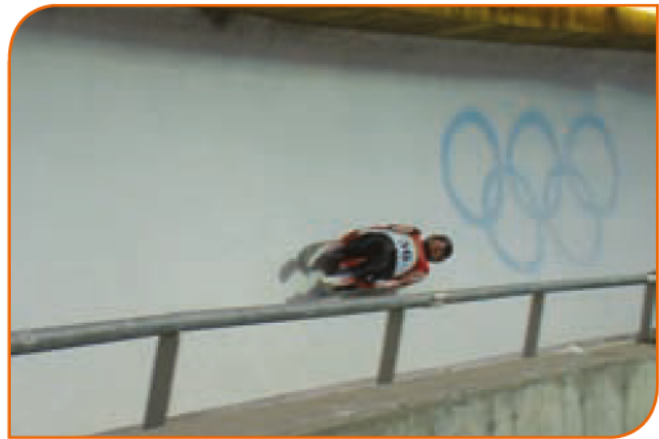
Using his knowledge and personal experiences, Dr. Hoeger writes engaging, informative books that thoroughly address today's fitness and wellness issues in a format accessible to students. Since 1990, he has been the most widely read fitness and wellness college textbook author in the United States. He has published a total of 60 editions of his nine fitness and wellness-related titles. Among the textbooks written for Wadsworth/Cengage Learning are *Lifetime Physical Fitness and Wellness: A Personalized Program*, 13th edition; *Fitness and Wellness*, 11th edition; *Principles and Labs for Fitness and Wellness*, 13th edition; *Wellness: Guidelines for a*

Healthy Lifestyle, 4th edition; and *Water Aerobics for Fitness and 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, Muscular Strength and Endurance, and Soda 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 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. In 2011, he raced in the 800-, 1,500-, and 5,000-meter events in track and field at the World Masters Athletic (Track and Field) Championships held in Sacramento, California. At different times in 2012, 2013, and 2014, he reached All-American standards for his age group by USA Track and Field including 800-meter, 1,500-meter, and 1.0-mile events.

Sharon A. Hoeger is vice president of Fitness & Wellness, Inc., of Boise, Idaho. Sharon received her degree in computer science from Brigham Young University. In the 1980s, she served as a computer science instructor at the University of Texas of the Permian Basin. She is extensively involved in the research process used in retrieving the most current scientific information that goes into the revision of each textbook. She is also the author of the software that was written specifically



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for the fitness and wellness textbooks. Her innovations in this area since the publication of the first edition of *Lifetime Physical Fitness & Wellness* in 1986 set the standard for fitness and wellness computer software used in this market today.

Sharon is a coauthor of five of the seven fitness and wellness titles. She also served as chef de mission (chief of delegation) for the Venezuelan Olympic Team at the 2006 Winter Olympics in Turin, Italy. A former gymnast, she now participates in a variety of fitness activities to enjoy good health and maintain a high quality of life.



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Husband and wife have been jogging and strength training together for more than 37 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.”

Acknowledgments

The completion of the tenth edition of *Principles and Labs for Physical Fitness* was made possible through the contributions of many professionals throughout the country. In particular, we express our gratitude to the reviewers of the ninth edition; their valuable comments and suggestions are sincerely appreciated.

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Why Physical Fitness?

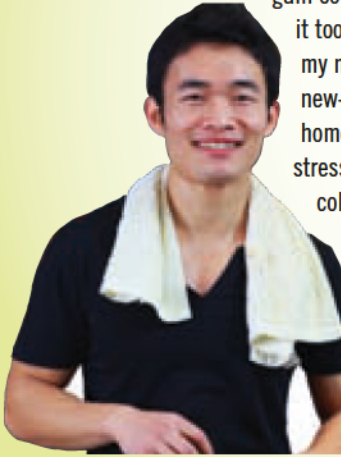
“To give anything less than your best is to sacrifice the gift.”
—Steve Prefontaine

OBJECTIVES

- Understand the health and fitness consequences of physical inactivity.
- Identify the major health problems in the United States.
- Learn how to monitor daily physical activity.
- Learn the *Physical Activity Guidelines for Americans*.
- Describe the difference between physical activity and exercise.
- Define physical fitness and list the components of health-related and skill-related fitness.
- Differentiate health-fitness standards and physical-fitness standards.
- Point out the benefits and the significance of participating in a lifetime exercise program.
- List national health objectives for the year 2020.
- Determine if you can safely initiate an exercise program.
- Learn to assess resting heart rate and blood pressure.

REAL LIFE STORY | Jeremy's Experience

I was a multi-sport athlete in high school. I played soccer, football, basketball, and ran track. I was not the best athlete on these teams and I didn't have a chance to make a college team, but I sure loved sports and athletic competition. To earn extra money for college, I worked for a fast food chain that summer. I was so busy that I didn't do any fitness activities or play sports that summer and I ate too much junk food which caused me to gain some weight. Later in college, it took some time to get used to my new surroundings and the new-found freedom from my home life. My friends kept stressing that I needed to enjoy college life as much as possible and not worry so much about academics. We went to a lot of parties and watched sporting events. There was always plenty of alcohol at these activities. I



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know we drank way too much, we didn't exercise, and my grades suffered as a result. I shouldn't have been so shocked when I saw my final grades. To add insult to injury, it really hit home when I signed up for the fitness and wellness class and found out I had gained more than 15 pounds since high school graduation. My fitness test results showed I was not even in an average fitness category for most components.

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

FAQ

Why should I take a fitness and wellness course?

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

Will the attainment of good physical fitness be sufficient to ensure good health?

Regular participation in a sound physical fitness program will provide substantial health benefits and significantly decrease the

risk of many chronic diseases. And although good fitness often motivates toward adoption of additional positive lifestyle behaviors, to maximize the benefits for a healthier, more productive, happier, and longer life we have to pay attention to all seven dimensions of wellness: physical, social, mental, emotional, occupational, environmental, and spiritual. These dimensions are interrelated, and one frequently affects the other. A wellness way of life requires a constant and deliberate effort to stay healthy and achieve the highest potential for well-being within all dimensions of wellness.

If a person is going to do only one thing to improve health, what would it be?

This is a common question. It is a mistake to think, though, that you can modify just one factor and enjoy wellness. Wellness requires a constant and deliberate effort to change unhealthy behaviors and reinforce healthy behaviors. Although it is difficult to work on many lifestyle changes all at once, being involved in a regular physical activity program, proper nutrition, and avoidance of addictive behavior are lifestyle factors to work on first. Others should follow, depending on your current lifestyle behaviors.

MyProfile: General Understanding of Fitness and Wellness

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

- I. The minimum requirement in the U.S. Federal Physical Activity Guidelines is that you accumulate _____ minutes of moderate-intensity aerobic activity or _____ minutes of vigorous-intensity aerobic activity on a weekly basis.
- II. Cardiorespiratory endurance, strength, power, flexibility, agility, and speed are the basic components of health-related fitness. ___ True ___ False
- III. My current blood pressure is _____ / _____ mm Hg which is classified as (check one): ___normal, ___pre-hypertension, ___hypertension.
- IV. Are you aware of potential risk factors in your life and personal family health history that may increase your chances of developing disease? ___ Yes ___ No

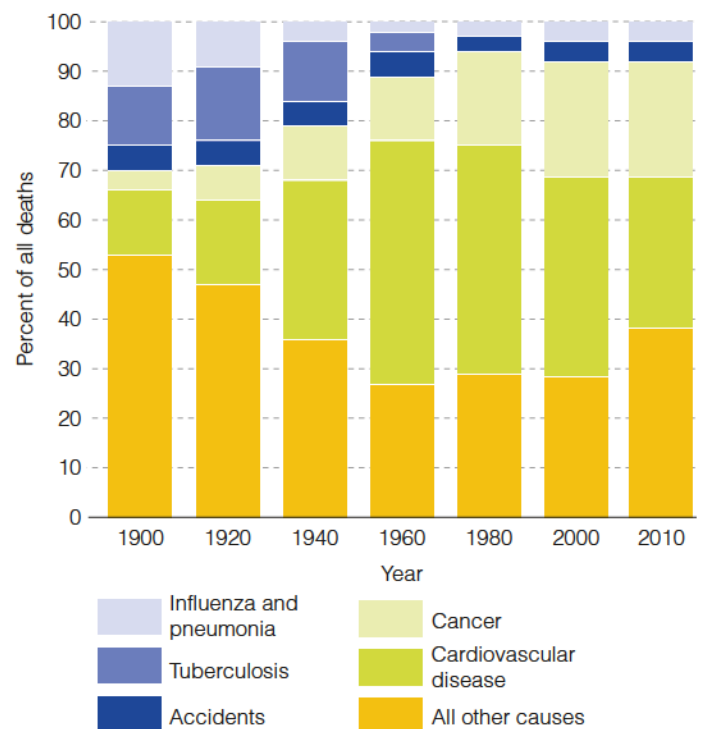
The current sedentary pattern of life seen in most developed countries has led to a widespread global interest in **health** and preventive medicine programs. Thus, over the past four decades there has been a large increase in the number of people participating in organized fitness and wellness programs. From an initial fitness fad in the early 1970s, fitness and wellness programs are now a trend that is very much part of the American way of life. The growing number of participants is attributed primarily to scientific evidence linking regular physical activity and positive lifestyle habits to better health, longevity, quality of life, and total well-being.

Research findings in the past few years have shown that physical inactivity and a negative lifestyle seriously threaten health and hasten the deterioration rate of the human body. Physically active people live longer than their inactive counterparts, even if activity begins later in life. Estimates indicate that more than 234,022 deaths in the United States yearly are attributed to physical inactivity.¹ Similar trends are found in most industrialized nations throughout the world.

The human organism needs movement and activity to grow, develop, and maintain health. Advances in modern technology, however, have almost completely eliminated the necessity for physical exertion in daily life. Physical activity is no longer a natural part of our existence. We live in an automated society, where most of the activities that used to require strenuous exertion can be accomplished by machines with the simple pull of a handle or push of a button. This epidemic of physical inactivity is the second greatest threat to U.S. public health and has been termed **Sedentary Death Syndrome**, or SeDS (the number-one threat is tobacco use—the largest cause of preventable deaths).

At the beginning of the 20th century, **life expectancy** for a child born in the United States was only 47 years. The most common health problems in the Western world were infectious diseases, such as tuberculosis, diphtheria, influenza, kidney disease, polio, and other diseases of infancy. Progress in the medical field largely eliminated these diseases. Then, as more North American people started to enjoy the “good life” (sedentary living, alcohol, fatty foods, excessive sweets, tobacco, drugs), we saw a parallel increase

FIGURE 1.1 Causes of death in the United States for selected years.



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

in the incidence of **chronic diseases** such as hypertension, coronary heart disease, atherosclerosis, strokes, diabetes, cancer, emphysema, and cirrhosis of the liver (see Figure 1.1). According to the World Health Organization

Health A state of complete well-being, and not just the absence of disease or infirmity.

Sedentary Death Syndrome (SeDS) Term used to describe deaths that are attributed to a lack of regular physical activity.

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

Chronic diseases Illnesses that develop and last a long time.

(WHO), chronic diseases account for 60 percent of all deaths worldwide.²

As the incidence of chronic diseases climbed, we recognized that prevention is the best medicine. Consequently, a fitness and wellness movement developed gradually in the 1980s. People began to realize that good health is mostly self-controlled and that the leading causes of premature death and illness in North America could be prevented by adhering to positive lifestyle habits. We all desire to live a long life, and a healthy lifestyle program focuses on enhancing the overall quality of life for as long as we live.

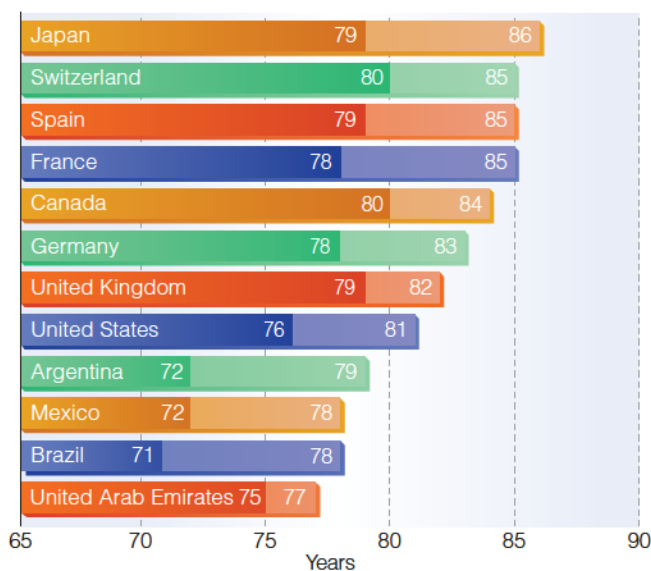
There are three basic factors that determine our health and longevity: genetics, the environment, and our behavior. Although we cannot change our genetic pool, we can exert control over the environment and our health behaviors so that we may reach our full physical potential based on our own genetic code. How we accomplish this goal will be thoroughly discussed through the chapters of this book.

Life Expectancy

Based on WHO data, the United States ranks 33rd in the world for life expectancy (Figure 1.2). Japan ranks first in the world, with an overall life expectancy of 82.6 years. 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.

Currently, the average life expectancy in the United States is 78.7 years (76.3 years for men and 81.1 years for women). While in the past decade alone life expectancy has

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



Dark color is men; light color is women.

Source: United Nations, "Social Indicators: Indicators on Health," <http://unstats.un.org/unsd/demographic/products/socind/health.htm>, downloaded January 9, 2012.

increased by 1 year, the news 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 experiencing disability. Mortality has been postponed, because medical treatments allow people to live longer with various chronic ailments (cardiovascular disease, cancer, diabetes, etc.).

Several factors may account for the current U.S. life expectancy ranking: the extremely poor health of some groups (such as Native Americans, rural African Americans, and the inner-city poor), the low level of daily physical activity, the high incidence of tobacco use and coronary heart disease, fairly high levels of violence (notably homicides), and the obesity epidemic. Furthermore, a recent report by the Organisation for Economic Cooperation and Development (OECD) found that while the United States far outspent every other country in health care cost per capita, it also easily had the highest rates of obesity of all 36 OECD countries.³

Life expectancy for men in the United States is almost five years lower than in women. For years it has been assumed that the difference is based on biology, but most likely the gender gap is related to lifestyle behaviors most commonly observed in men. Around 1980, the gender gap in life expectancy was almost 8 years. This decrease in the gender gap is thought to be due the fact that women are increasingly taking on jobs, habits, and stressors of men such as smoking, drinking, and employment outside the home.

Men, nonetheless, still report higher stress on the job and are less likely to engage in stress-management programs. Also, 95 percent of employees in the ten most dangerous jobs are men. Furthermore, men's health is not given the same degree of attention in terms of public health policies. Fewer programs are available that specifically target men's health issues. Thus, men need to take a more proactive role for their own health and public health policies.

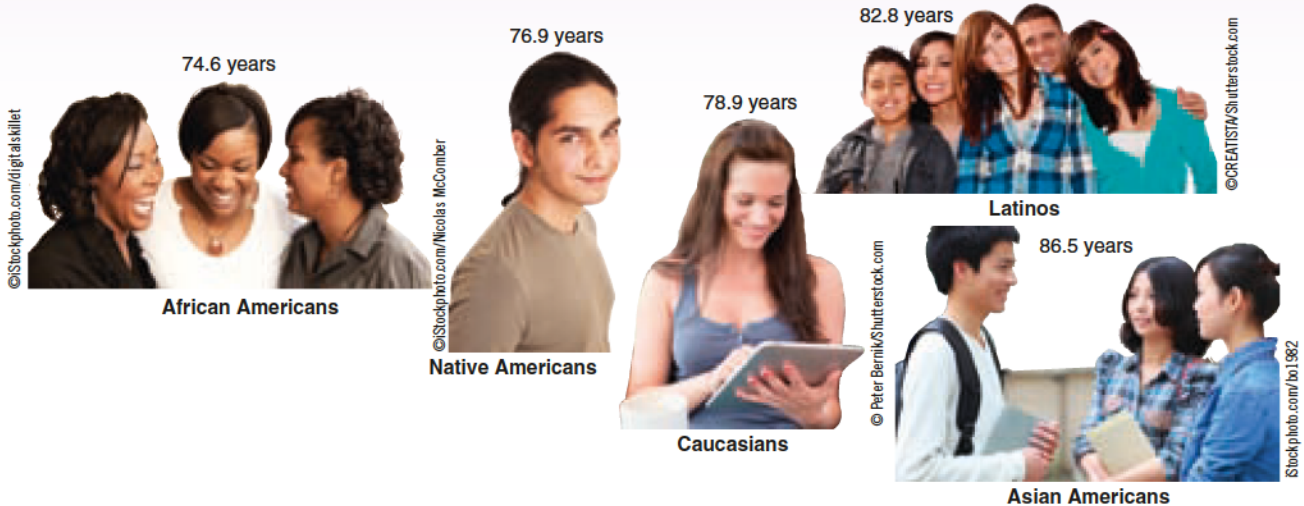
"Masculinity" itself is also partially to blame. Men are less likely to visit a physician when something is wrong and are less likely to heed preventive care visits to be screened for potential risk factors such as hypertension, elevated cholesterol, diabetes, obesity, substance abuse, and depression or anxiety. Chronic diseases in men are often diagnosed at a later stage, when a cure or adequate management is more difficult to achieve.

Men typically drive faster than women and are more likely to engage in risk-taking activities. Of all road traffic fatalities among countries studied in the most recent OECD report, a disparate 74% of victims were men.

Although life expectancy in the United States gradually increased by 30 years over the past century, scientists from the National Institute of Aging believe that in the coming decades the average lifespan may decrease by as much as five years. This decrease in life expectancy will be related primarily to the growing challenges of inactivity and obesity. According to current estimates from the Centers for Disease Control and Prevention, 35.7 percent of the adult population in the United States is obese. As a nation, we are seeing the consequences of these numbers unfold. The latest statistical update from the American Heart Association reported

DIVERSITY CONSIDERATIONS: Ethnic Life Expectancy

Life expectancy in the United States has increased by almost 9 years since 1960. There is, however, a disparity among ethnic groups. Asian Americans live the longest, while African Americans have the lowest lifespan.



Decreasing Disparities: Improving lifestyle, how one grows up (e.g., access to health care, physical activity, good nutrition, personal safety), the work environment, and conditions under which one grows old, greatly increase the chances for a longer and healthier life. Healthy choices you make *today* dictate quality of life and wellness during older age.

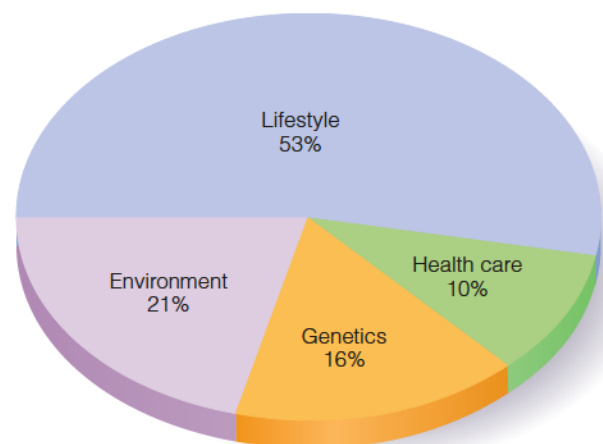
that the incidence of diabetes has been climbing dramatically each year in parallel step with the increased incidence of obesity.⁴ If this trend continues, the current generation of children may not outlive their parents. Additional information on the obesity epidemic and its detrimental health consequences is given in Chapter 5.

Lifestyle as a Health Problem

As the incidence of chronic diseases rose, it became obvious that prevention was—and remains—the best medicine. According to the U.S. Surgeon General's office, more than half of the people who die in this country each year die because of what they do. Based on estimates, more than half of disease is lifestyle related, a fifth is attributed to the environment, and a tenth is influenced by the health care the individual receives. Only 16 percent is related to genetic factors (Figure 1.3). Thus, the individual controls as much as 84 percent of his or her vulnerability to disease—and thus quality of life. The same data indicate that 83 percent of deaths before age 65 are preventable. In essence, most people in the United States are threatened by the very lives they lead today.

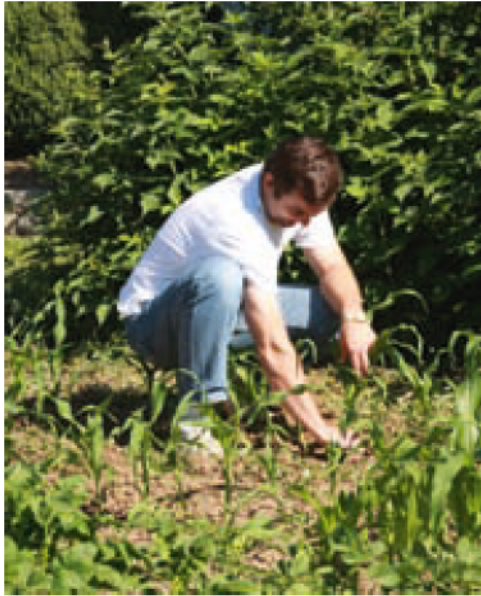
Because of the unhealthy lifestyles that many young adults lead, their bodies may be middle-aged or older! Many physical education programs in schools do not emphasize

FIGURE 1.3 Estimated impact of the factors that affect health and well-being.



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the skills necessary for youth to maintain a high level of fitness and health throughout life. The intent of this book is to provide those skills and to help prepare you for a lifetime of physical fitness and wellness. A healthy lifestyle is self-controlled, and you can learn how to be responsible for your own health and fitness. Healthy choices made today influence health for decades.



Photos © Fitness & Wellness, Inc.

Exercise and an active lifestyle increase health, quality of life, and longevity.

Healthy Habits That Cut Risk for Serious Disease

According to the Centers for Disease Control and Prevention, four health living habits can reduce your risk of chronic diseases such as heart disease, cancer, and diabetes by almost 80 percent:

- Get at least 30 minutes of daily moderate-intensity physical activity.
- Never smoke.
- Eat a healthy diet (ample fruits and vegetables, whole-grain products, and low meat consumption).
- Maintain a body mass index (BMI) under 30.

The Nagano Lifestyle Experience The effects of a healthy lifestyle on life expectancy can be seen quite clearly in the Nagano longevity study. The city of Nagano is located in the Japanese Alps about 100 miles northwest of Tokyo. In the early 1980s, Nagano had the highest rate of cerebral vascular disease (strokes) in Japan. In 1981, concerned government and health care practitioners started to look for preventive measures. They noted that residents endured long snowy winters in this region. As a result,

1. physical activity among area residents was limited during the winter months; and
2. for generations, housewives preserved ample amounts of homegrown produce (pickled vegetables) to prepare for the inadequate supply of fresh vegetables during this colder time of the year.

On average, Nagano residents were consuming more than 15 grams of salt per day. Sodium intake was about three times the daily maximum dietary allowance in the United States. Lack of physical activity and high sodium intake are both major risk factors for stroke (see Chapter 11). An initiative was undertaken in this region of 2.1 million people to get the residents to decrease sodium intake, improve nutrition, and increase physical activity.

An ever rotating group of health care volunteers started to teach seminars and workshops at community centers, shopping malls, and supermarkets to educate residents regarding healthy lifestyle approaches aimed at decreasing stroke risk and promoting overall health and wellness. Presently, 4,750 volunteers host such workshops, and to date more than 250,000 people have served as health care volunteer instructors. These volunteers conduct occasional house visits to measure home-cooked meals' sodium content and provide nutritional recommendations. The people of Nagano now also have the largest average per capita vegetable consumption in Japan.

Furthermore, the government encourages people to practice sound dietary and physical activity habits by organizing and providing regular health-promoting activities in the community. In the Matsumoto locality, within the Nagano prefecture, city leaders have developed more than 100 walking routes to promote public and neighborhood communal physical activity. These groups are now regularly seen walking these routes during the winter months.

The results of the healthy lifestyle initiative have produced astonishing results. By 1990, about 9 years from the start of the Nagano program, life expectancy had increased 3½ years for women and 3 years for men. Today, the lifespan in the region continues to increase. In 2010, the Nagano prefecture generated the longest life expectancy in the entire world. Based on 2013 data, women and men in this region now live an average of 87.2 years and 80.9 years, respectively.

As an added side benefit, health care costs in Nagano are about \$2,500 per person per year as compared to the national Japanese average of \$3,120, and more than \$8,000 per person per year in the United States (see Economic Benefits on p. 26).

Adopting Healthy Habits at a Young Age

Lack of physical activity, an unhealthy diet, and tobacco use are three of the most critical risk factors leading to chronic disease and premature death. Most people understand this concept, but many underestimate their impact on health and quality of life. Science has shown that a change to healthy habits at any age provides substantial benefits. The results of an 18-year German project published in 2014, however, indicates that the earlier in life a healthy behavior is adopted, the better the health outcomes.⁵ Scientists looked at the effects of physical activity, exercise, nutrition, stress, socioeconomic status, smoking, sense of coherence, and social support, as well as the influence of these factors on overall health.

The results indicated that proper nutrition and physical activity had the greatest impact on people's health. Furthermore, individuals who had already adopted these health-promoting behaviors at the beginning of the study enjoyed better health at the conclusion of the project: The more active the participants and the healthier the eating pattern, the higher the level of physical fitness and health nearly two decades later. While health benefits can be reaped at any given point in the lifespan, disease prevention programs need to emphasize the adoption of healthy behaviors at an early age to attain the greatest benefits.

Physical Activity and Exercise Defined

Abundant scientific research over the past three decades has established a distinction between physical activity and exercise. **Physical activity** is bodily movement produced by

skeletal muscles that requires the expenditure of energy and produces progressive health benefits. Physical activity typically requires only a light-to-moderate intensity of effort. Examples of physical activity are walking to and from work, taking the stairs instead of elevators and escalators, gardening, doing household chores, dancing, and washing the car by hand. Physical inactivity, by contrast, implies a level of activity that is lower than that required to maintain good health.

Exercise is a type of physical 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, aerobics, swimming, and strength training. Exercise is usually viewed as an activity that requires a vigorous-intensity effort.

Importance of Increased Physical Activity

The U.S. Surgeon General has stated that poor health as a result of lack of physical activity is a serious public health problem that must be met head-on at once. 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.

Among the benefits of regular physical activity and exercise are significantly reduced risks for developing or dying from heart disease, stroke, type 2 diabetes, colon and breast cancers, high blood pressure, osteoporotic fractures, and even dementia and Alzheimer's. Regular physical activity also is important for the health of muscles, bones, and joints, and it seems to reduce symptoms of depression and anxiety, improve mood, improve memory, and enhance ability to perform daily tasks throughout life. It also can help control health care costs and maintain a high quality of life into old age.

Moderate physical activity has been defined as any activity that requires an energy expenditure of 150 calories per day, or 1,000 calories per week. The general health recommendation is that people strive to accumulate 150 minutes of moderate-intensity physical

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

Exercise A type of physical activity that requires planned, structured, and repetitive bodily movement with the intent of improving or maintaining one or more components of physical fitness.

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



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Combined upper and lower body exercises, such as cross-country skiing, increase the energy demands of the activity.



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Regular participation in a lifetime physical activity program increases quality of life at all ages.

activity per week (alternatively 75 minutes of vigorous aerobic activity may be substituted) in addition to two strength-training sessions or activities per week. Physical activity should preferably be divided into 30-minute segments over a minimum of 5 days each week (Table 1.1). Whereas 30 minutes of continuous activity is preferred, on days when time is limited, three activity sessions of at least 10 minutes each still provide substantial health benefits. Examples of moderate physical activity are brisk walking or cycling, playing basketball or volleyball, swimming, water aerobics, fast dancing, pushing a stroller, raking leaves, shoveling snow, washing or waxing a car, washing windows or floors, and even gardening. Light-intensity activities of daily living such as casual walking, self-care, shopping, or activities lasting less than 10 minutes cannot be included as part of the moderate physical activity recommendation.

Although accumulating 30 minutes of moderate- or vigorous-intensity physical activity provide substantial health benefits, new data indicate that most of these benefits

may be voided if people spend most of the rest of the day in a sedentary condition. Sitting for long periods of time seems to be an independent risk factor for premature morbidity and mortality. This topic is discussed under the heading “*Sitting Disease: A 21st Century Chronic Disease*” on page 14 in this chapter.

Because of the ever-growing epidemic of obesity in the United States and the world, adults are encouraged to increase physical activity beyond the minimum requirements and adjust their caloric intake until they find they are maintaining a healthy weight. Individuals are also advised that additional physical activity beyond minimum thresholds is necessary for some and can provide additional health benefits for all. This recommendation goes along with evidence indicating that people who maintain healthy weight typically accumulate 1 hour of daily physical activity.

TABLE 1.1 Physical Activity Recommendations

Benefits	Duration	Intensity	Frequency per Week	Weekly Time
Health	30 min	MI*	≥5 times	≥150 min
Health and fitness	≥20 min	VI*	≥3 times	≥75 min
Health, fitness, and weight gain prevention	60 min	MI/VI†	5–7 times	≥300 min
Health, fitness, and weight regain prevention	60–90 min	MI/VI	5–7 times	≥450 min

*MI = moderate intensity, VI = vigorous intensity
 †MI/VI = You may use MI, VI, or a combination of the two
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A very high level of physical fitness is necessary to participate in competitive sports.

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In sum, although health benefits are derived from 30 minutes of physical activity performed on most days of the week, people with a tendency to gain weight need to be physically active for longer, from 60 to as many as 90 minutes daily, to prevent weight gain. This amount of activity per day provides additional health benefits, including a lower risk for cardiovascular disease and diabetes.

National Initiatives to Promote Healthy and Active Lifestyles

Federal Guidelines for Physical Activity

Because of the importance of physical activity to our health, the U.S. Department of Health and Human Services has issued Federal Physical Activity Guidelines for Americans. These guidelines complement the *Dietary Guidelines for Americans* (Chapter 3, pages 123–124) as well as international recommendations issued by the World Health Organization (WHO) and further substantiate previous recommendations issued by the American College of Sports Medicine (ACSM) and the AHA in 2007,⁶ and the U.S. Surgeon General in 1996.⁷

The federal guidelines provide science-based guidance on the importance of being physically active to promote health and reduce the risk for chronic diseases. The federal guidelines include the following recommendations:⁸

Adults between 18 and 64 Years of Age

- Adults should do 2 hours and 30 minutes a week of moderate-intensity aerobic (cardiorespiratory) physical activity, 1 hour and 15 minutes (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 6). 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