Principles and Labs for Fitness and Wellness

16e

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***Principles and Labs for Fitness and Wellness,* 16e**
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Chapter Labs

This edition is dedicated to Marilyn Brown, Joanne Saliger, and to the memory of Doug Morton. Their unconditional help, support, guidance, and friendship throughout almost four decades of writing is most sincerely appreciated and regarded as an eternal treasure to the senior authors of this book.

Contents


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Preface

The current American way of life does not provide people with sufficient physical activity to maintain good health and improve quality of life. Actually, our way of life is such a serious threat to our health that it increases the deterioration rate of the human body and leads to premature illness and death.

Data released by the Centers for Disease Control and Prevention (CDC) indicate that only about 23 percent of U.S. adults aged 18 to 64 meet the federal *Physical Activity Guidelines* for both aerobic and muscular fitness activities, whereas 45 percent are inactive and meet neither guideline. Yet, most people in the United States say they believe that physical activity and positive lifestyle habits promote better health. However, many do not reap benefits because they simply do not know how to implement a sound fitness and wellness program that will yield the desired results.

The U.S. Surgeon General has determined that lack of physical activity is detrimental to good health. 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 this 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.

Furthermore, the science of behavioral therapy has established that many 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.

Along with the most up-to-date health, fitness, and nutrition guidelines, the information in this book provides extensive behavior modification strategies to help you abandon negative habits and adopt and maintain healthy behaviors. As you study and assess physical fitness and wellness parameters, you need to take a critical look at your behaviors and lifestyle—and most likely make selected permanent changes to promote your overall health and wellness.

Principles and Labs for Fitness and Wellness contains 15 chapters and 42 laboratories (labs) that serve as guides to implement a complete lifetime fitness and wellness program. The book's contents point out the need to go beyond the basic components of fitness to achieve total well-being.

In addition to a thorough discussion of physical fitness—including all health- and performance-related components—extensive and up-to-date information is provided on behavior modification, nutrition, weight management, stress management, cardiovascular and cancer-risk reduction, exercise and aging, prevention of sexually transmitted infections (STIs), and substance abuse control (including tobacco, alcohol, and other psychoactive drugs). The information has been written to provide you with the necessary tools and guidelines for an active lifestyle and a wellness way of life.

Scientific evidence has clearly shown that improving the quality—and most likely the longevity—of your life is a matter of personal choice. As you work through the various chapters and laboratories in the book, you will be able to develop and regularly update your healthy lifestyle program to improve physical fitness and personal wellness. The emphasis throughout the book is on teaching you how to take control of your health and lifestyle habits so that you can make a constant and deliberate effort to stay healthy and achieve the highest potential for well-being.

New in the 16th Edition

All chapters in the 16th edition of *Principles and Labs for Fitness & Wellness* have been revised and updated according to recent advances and recommendations in the field, including information reported in the literature and at professional health, fitness, and sports medicine conferences.

In addition to the Hoeger Key to Wellness boxes, we continue to provide the Personal Profile feature at the beginning of each chapter so that students can evaluate their current knowledge of the chapter's topic. Included also are 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 pique the students' interest in the chapter contents.

Chapter Updates

Chapter 1, Physical Fitness and Wellness

- Updated facts and statistics according to the latest reports in the literature
- Several redesigned figures to enhance the content retention
- Additional information on the federal guidelines for physical activity
- New information on the benefits of using activity trackers
- Updates on the information about medical errors
- A modified health history questionnaire that includes key questions related to viral infections
- Conformity of the blood pressure assessment with the 2019 American Heart Association guidelines for the proper measurement of blood pressure

Chapter 2, Behavior Modification

- Extensive revision and streamlining of the *Living in a Toxic Health and Fitness Environment* and *Planning and Willpower* sections
- With the current trend toward learning outcomes in higher education, the section on SMART goals now teaches students to write goals with a wellness outcome in mind

Chapter 3, Nutrition for Wellness

- Improved organization of chapter contents
- New information and/or updates on the topics such as how often should I eat, fluids for adequate hydration, stress and healthy nutrition, liquid calories, high-fructose corn syrup, ultra-processed foods, and vitamin D
- Inclusion of the main recommendations of the *2020–2025 Dietary Guidelines for Americans*
- Updated information on key nutrients of concern in the American diet

Chapter 4, Body Composition

- Chapter contents have been reorganized to introduce the section on *Metrics Used to Assess Body Size and Shape* first so that students can obtain a general understanding of their current body weight classification prior to evaluating their actual body composition through more complex assessment techniques
- New information is provided on the assessment of body composition through bioelectrical impedance, body mass index, and waist circumference, as well as current obesity trends

Chapter 5, Weight Management

- Contents were reorganized and extensively edited to enhance readability
- Updated tables on the incidence of overweight and obesity in the United States published by the Centers for Disease Control and Prevention
- New section for students who need to gain weight
- Extensive update on the fad dieting content
- An update to the section on today's most popular diets (now also including the Whole 30, Eating Clean, and Detox diets), along with pros and cons to all the diets listed
- New content on rubberized sweat suits and waist trainers
- Enhanced discussion of disordered eating versus eating disorders and updates on the most common forms of eating disorders, including a new section on avoidant restrictive food intake behavior (ARFID)
- Ideas to start the day with a healthy breakfast

Chapter 6, Cardiorespiratory Endurance

- Enhanced content on the *Guidelines for Developing Cardiorespiratory Endurance* and the variables that govern exercise prescription
- Cardiorespiratory endurance exercise prescriptions have been updated to conform with the newest release of the *ACSM's Guidelines for Exercise Testing and Prescription* (11th ed., 2022)
- The most recent research on the unlimited benefits of increased physical activity on cardiovascular health
- Addition of activity-tracking information and accuracy under *Volume* of cardiorespiratory exercise
- Updated information on the detrimental effects of excessive daily sitting time
- New section on *Physical Activity and Exercise for People with Disability*

Chapter 7, Muscular Fitness

- An update on the mounting evidence of strength-training on decreasing all-cause and cancer-related deaths
- All strength-training prescriptions guidelines have been updated to conform with latest release of the *ACSM's Guidelines for Exercise Testing and Prescription* (11th ed., 2022)
- Up-to-date dietary guidelines for strength and muscular development
- Expanded information on *Core Strength-Training*, including antiextensors, antilateral flexors, and antirotators principles.
- New strength-training exercises

Chapter 8, Muscular Flexibility

- FITT-VP Flexibility Guidelines within the text and figures conform with 2022 Guidelines for Exercise Testing and Prescription by the American College of Sports Medicine

- Revised *Benefits of Good Flexibility* section
- An update to the sections on *Preventing and Rehabilitating Low Back pain, Causes of Low Back Pain, When to Call a Physician,* and *Surgery*
- New flexibility exercises

Chapter 9, Personal Fitness Programming

- Simplified chapter contents to enhance readability
- Enhanced section on *Exercise in Cold Water*
- Updated guidelines for exercise during pregnancy and contraindications to exercise during pregnancy

Chapter 10, Stress Assessment and Management Techniques

- New feature box on *The Power of Positivity*
- Expanded information in the *Sleep Management* section, including stages of sleep, health effects of sleep deprivation, tips for better sleep, and sleeping drugs
- New section on *Mental Health*
- Enhanced information on *Characteristics of Good Stress Managers*

Chapter 11, Cardiovascular Disease Prevention

- Up-to-date data on the prevalence of cardiovascular disease
- Updates have been added to the self-assessment coronary heart disease risk factor analysis
- Several coronary heart disease risk factors are presented in a condensed version
- Information on the role of metabolic equivalents (MET level) on cardiovascular health and longevity and the importance of physical activity throughout the day has been added to the *Physical Inactivity* risk factor for coronary heart disease
- Enhanced, updated, and simplified explanation for the *Abnormal Cholesterol* Profile risk factor for cardiovascular disease
- An updated section on *Metabolic Syndrome*
- Several updates are included in the *Hypertension* section, including the America Heart Association and the American College of Cardiology new guidelines for the prevention, detection, evaluation, and management of blood pressure; and the role of aerobic and strengthening exercises on blood pressure
- Additional information has been added to the section on other, lesser known potential risk factors for coronary heart disease, including resting heart rate, sleep, and emotional distress

Chapter 12, Cancer Prevention

- Inclusion of the latest figures on the U.S. incidence and death rates for major cancer sites
- Updated figures on the estimates of the relative role of the major cancer-causing factors
- Up-to-date guidelines for cancer prevention
- New information on the effects of exercise on cancer risk, aspirin and cancer risk, sugar and cancer, alcohol and cancer, and body weight and cancer
- Updates to the *Cancer Questionnaire: Assessing Your Risks*
- Updated data on the incidence and mortality rates of cancer, along with the most common site-specific cancer risk factors

Chapter 13, Addictive Behavior

- New figures reflecting data specific to addictive behaviors most prevalent in college students, including marijuana, heroin, and alcohol abuse
- Updated data on the recent trends in substance abuse reported in the *National Survey on Drug Use and Health* by the U.S. Department of Health and Human Services
- Enhanced information on the addictive, physiological effects, and trends of caffeine intake
- Expanded contents on *Nonmedical Use of Prescription Drugs*
- Expanded information on *Marijuana* use and new information on the *Legalization of Marijuana,* its use and trends
- Additional information on the use of electronic cigarettes

Chapter 14, Sexually Transmitted Infections Prevention

- New data on the unprecedented rise of new cases of chlamydia, gonorrhea, and syphilis—now reaching an all-time high in the United States
- STI screening recommendations for sexually active adults have been updated according to recently published CDC guidelines
- Data and graphs on the prevalence of STIs have been added and updated according to the latest data from the CDC
- HPV vaccination schedule recommendations for adolescents have been updated according to CDC guidelines

Chapter 15, Lifetime Fitness and Wellness

- Updates were made to the *Life Expectancy and Physiological Age Prediction Questionnaire* and to the *Complementary and Alternative Medicine* and *Personal Trainers* sections

Ancillaries

- **Health MindTap for Principles and Labs for Fitness and Wellness.** MindTap, today's most innovative online learning platform, powers your students from memorization to mastery. MindTap gives you complete control of your course to provide engaging content, challenge every individual, and build students' confidence.
- **Diet & Wellness Plus.** Diet & Wellness Plus helps you understand how nutrition relates to your personal health goals. Track your diet and activity, generate reports, and analyze the nutritional value of the food you eat. Diet & Wellness Plus includes over 75,000 foods as well as custom food and recipe features. The Behavior Change Planner helps you identify risks in your life and guides you through the key steps to make positive changes.
- **Cognero.** Cengage Testing powered by Cognero® is a flexible online system that allows you to import, edit, and manipulate content from the text's test bank or elsewhere, including your own favorite test questions; create multiple test versions in an instant; and deliver tests from your LMS, your classroom, or wherever you want.
- **Instructor's Companion Site.** Everything you need for your course in one place! This collection of product-specific lecture and class tools is available online via www.cengage.com/login. Access and download PowerPoint presentations, images, instructors' manual, and more.

Brief Author Biographies

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

Nancie Battaglia/Getty Images

69 editions of his nine fitness and wellness-related titles. Among the textbooks written for Cengage Learning are *Lifetime Physical Fitness and Wellness: A Personalized Program,* 16th edition; *Fitness & Wellness,* 14th edition; *Principles and Labs for Physical Fitness,* 10th edition; *Wellness: Guidelines for a Healthy Lifestyle,* 4th edition; and *Water Aerobics for Fitness & Wellness,* 4th edition (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 and 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 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 mts, 1,500 mts, and the mile) in 2012, 2014, 2015, 2016, 2017, 2018, 2019, 2020, and 2021, 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 mts and the 1,500 mts at the World Masters Track and Field Championships held in Perth, Australia. He finished 7th (out of 12 finalists) in the 800 mts and 8th (out of 16 finalists) in the 1,500 mts. In 2019, he finished second in the 800 m at the USATF Masters Outdoor Track and Field Championships and won the gold medal in the 800 m and 5K, and the silver medal in the 1,500 m and 3,000 m at the Hunstman World Senior Games in St. George, Utah.

Sharon A. Hoeger is vice president of Fitness & Wellness, Inc., of Boise, Idaho. Sharon received her degree in computer science from Brigham Young University. 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 for the fitness and wellness textbooks. Her innovations in this area since the publication of the first edition of *Lifetime Physical Fitness and 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.

Husband and wife have been jogging and strength training together for more than 45 years. They are the

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proud parents of five children, all of whom are involved in sports and lifetime fitness activities. Their motto: "Families that exercise together, stay together."

Andrew D. Meteer received a degree in exercise science and has served as a personal trainer at Equinox Sports Club in New York City. An active member of the American College of Sports Medicine, Andrew brings vast experience in exercise programming for a diverse population and expertise with fitness trends in business and community settings. His excellent writing skills and up-to-date research-based knowledge in the field further strengthen market-leading fitness and wellness concepts presented in this book.

Cherie I. Hoeger received her degree in English with an emphasis in editing for publication. She has been working for 19 years 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). She joined Fitness & Wellness, Inc. in 2014 as a writer and scientific literature reviewer. She took on a more significant role as a coauthor in 2016. Her work has greatly enhanced the excellent quality of the *Fitness & Wellness* textbooks. She is a firm believer in living a healthy and wellness lifestyle, regularly attends professional meetings in the field, and is an active member of the American College of Sports Medicine.

Cherie is also co-founder and CEO of Saalt (a company that aims to make cleaner and more sustainable period care accessible to everyone). In March of 2022, she was recognized as the *Idaho honoree* for *USA Today's Women of the Year* and received an *Idaho Business Review 2022 Accomplished Under 40 award*.

Acknowledgments

The completion of the 16th edition of *Principles and Labs for Fitness and Wellness* was made possible through the contributions of many professionals throughout the country.

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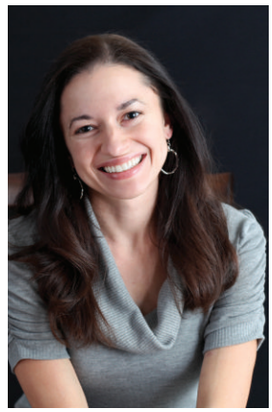

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In particular, we express our gratitude to the reviewers of the 15th edition; their valuable comments and suggestions are sincerely appreciated.

Reviewers for the 16th edition

Alan M. Beck, Washington University in St. Louis

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Sheena Thompson, Midland College

1

The human body is extremely resilient during youth and not as resilient during middle and older age. The power of prevention, nonetheless, is yours: it enables you to make healthy lifestyle choices today that will prevent disease in the future and increase the quality and length of your life.

Tim Tiedemann

Physical Fitness and Wellness

Learning Objectives

1.1 **Describe** the health and fitness consequences of physical inactivity.

1.2 **Identify** the major health problems in the United States.

1.3 **Monitor** your daily physical activity.

1.4 **Describe** the federal Physical Activity Guidelines for Americans.

1.5 **Define** wellness and list its dimensions.

1.6 **Compare** health fitness standards with physical fitness standards.

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

1.8 **Describe** the benefits and significance of participating in a comprehensive wellness program.

1.9 **Determine** if you can safely initiate an exercise program.

1.10 **Assess** resting heart rate and blood pressure.

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?

Is the attainment of good physical fitness 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 should it be?

Though this is a common question, it is a mistake to think 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, avoiding excessive sitting, observing proper nutrition, and avoiding addictive behaviors are lifestyle factors to work on first. Others should follow, depending on your current lifestyle behaviors.

Real Life Story | Jeremy's Experience

I was a multisport athlete in high school. I played soccer, football, and 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 after high school graduation. 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 newfound 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 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.

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I am so glad the fitness course was a required class; 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.

Personal Profile | General Understanding of Fitness and Wellness

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

1. Are you aware of potential risk factors in your life that may increase your chances of developing disease? What do you know about your family's health history? Is there any other information that you feel you need to know?
2. What are the top two leading causes of death in your age group? What steps do you take to protect yourself and set a good example for others?
3. When are you most physically active throughout the day? Is there a season of the year or day of the week when you are most active? What can you do to become more active on a regular basis?
4. Of the seven dimensions of wellness, which dimension do you pursue most? Which dimension do you ignore most? Why do you think you ignore this dimension of wellness?
5. What steps are you taking toward financial wellness?

Tanya Guillory

Exercise is considered to be the much-needed vaccine in our era of widespread chronic diseases.

Do you ever stop to think about factors that influence your actions on a typical day? As you consider typical moments from this past week, which actions were positive and healthy and which may have been negative or harmful? Did you go for a walk or have a conversation with a friend? Did you buy and eat food that you felt good about? Did you pursue a task that held purpose and meaning for you? Conversely, did you battle ongoing stress and anxiety or allow yourself irregular sleep? Did you settle for highly processed food? Did you struggle with relationship problems? Did you regress to previous, unhealthy behaviors?

Take a moment to consider whether the choices from the past week repeated over years would accumulate to promote wellness or to cause disease. Your health is a product of complex, intertwined physical, mental, inherited, and environmental factors that directly influence your state of wellness. This book will help you navigate through these factors that influence your behavior and will provide you with the necessary tools to make changes that are right for your life. We will begin this chapter by looking at the big picture and will then use a personalized approach throughout the book to help you create a program aimed at helping you develop a lifetime fitness and wellness lifestyle.

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

Chronic diseases Illnesses that develop as a result of an unhealthy lifestyle and last a long time.

1.1 The Wellness Challenge for You Today

There are three basic factors that determine our health and longevity: genetics, the environment, and our behavior. In most cases, we cannot change our genetic circumstances, though the budding field of epigenetics is showing us that select genes can be switched on and off by lifestyle choices and environment. (For a more in-depth discussion on epigenetics, see *Epigenetics*, Chapter 12, page 467.) We can certainly, however, exert control over the environment and our health behaviors so that we may reach our full physical potential based on our genetic code (see Figure 1.1).

At the beginning of the 20th century, **life expectancy** for a child born in the U.S. 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 people started to enjoy the ease and excesses of modern life, we saw a parallel increase in the incidence of **chronic diseases** such as

Figure 1.1 Factors that affect health and longevity.

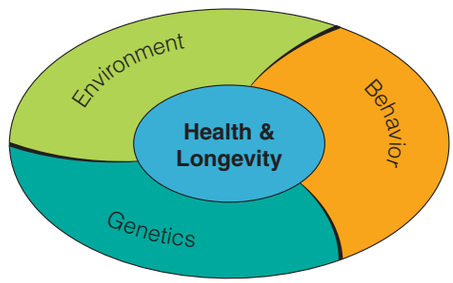
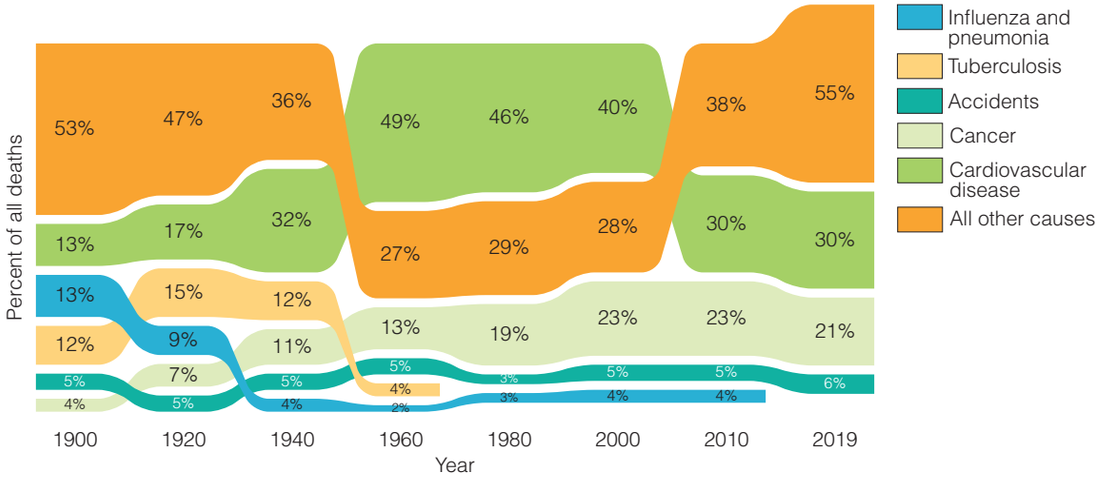


Figure 1.2 Causes of death in the United States for selected years.



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

cardiovascular disease, cancer, diabetes, and chronic respiratory diseases (Figure 1.2).

The underlying causes of death attributable to leading **risk factors** in the U.S. (Figure 1.3) indicate that most factors are related to lifestyle choices we make. 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. In fact, worldwide, a substantial number of deaths are linked to poor diet alone. Meanwhile, only a small proportion of disease is related to genetic factors (Figure 1.4). The individual controls most of his or her vulnerability to disease—and thus quality of life. In essence, most people in the U.S. are threatened by the very lives they lead today.

As our culture has adopted the ease of Western life, we have undergone profound cultural shifts at a rapid pace. In comparison, advances in past centuries were slow and gradual. Within the last century, we have made wide-reaching changes like overhauling our diet to include more processed, refined, sugary, and unhealthy fatty foods. We have become increasingly **sedentary**. We have changed our social interactions so that we are now always online or "plugged in." While it is impossible to completely tease out every cultural shift and its impact on health, we know for certain that some of these changes in our culture take a heavy toll on our population's overall health and wellness. We will begin by examining one of the most impactful cultural shifts. Let's consider the recent history of physical activity.

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. Scientific findings have shown that physical inactivity and a negative lifestyle seriously threaten health and hasten the deterioration rate of the human body. Most nations, both developed and developing, are experiencing an epidemic of physical inactivity. In the U.S., physical inactivity is the second greatest threat to public health (after tobacco use) and is often referenced in new concerns about *sitting disease,* **sedentary death syndrome (SeDS)**, and **hypokinetic diseases**.

Figure 1.3 Death from all causes attributable to lifestyle-related risk factors for men and women in the United States.

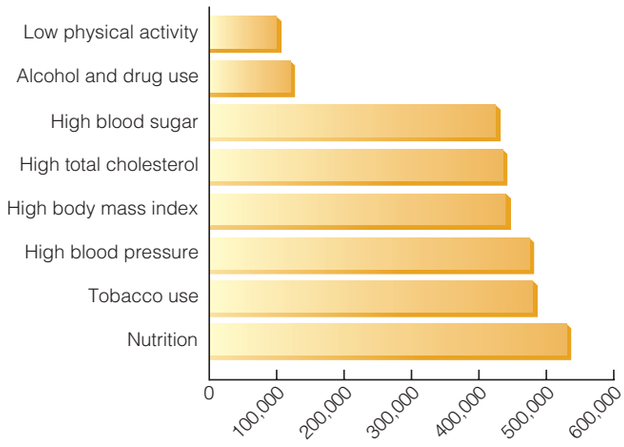
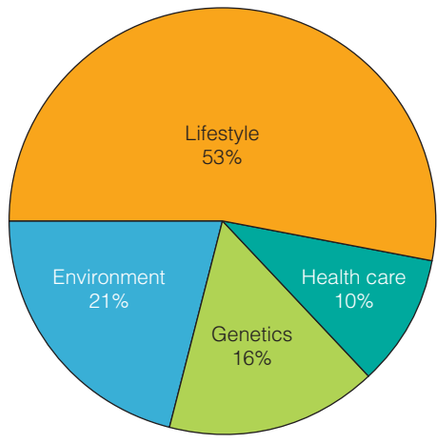


Figure 1.4 Estimated impact of the factors that affect health and well-being.



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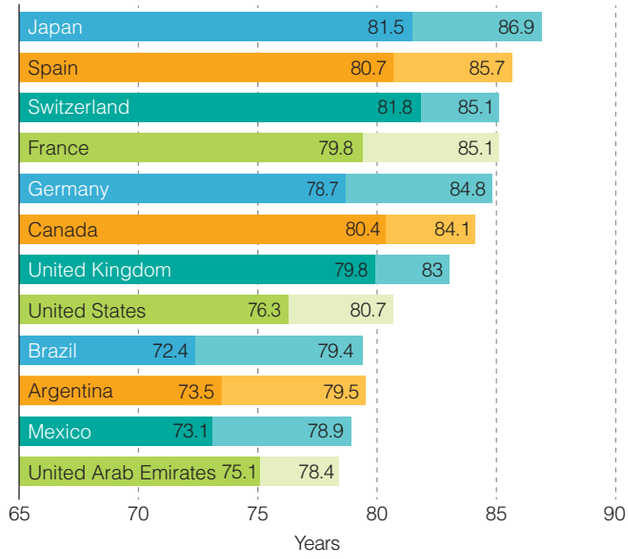
Modern-day conveniences lull people into a sedentary lifestyle.

Figure 1.5 Life expectancy at birth for selected countries: 2020 projections.



Dark color is men; light color is women.

SOURCE: Life Expectancy and Healthy Life Expectancy, World Health Organization, 2020.

As the populations of the world have adopted a more sedentary lifestyle, the world has seen a steep incline in obesity rates. Before 1980, obesity rates throughout the world remained relatively steady. Then, beginning in the 1980s, obesity rates started to grow rapidly, especially in the U.S., Australia, and England. Worldwide, obesity currently claims triple the number of victims as malnutrition. People who are overweight and obese are now the majority in the 34 countries that make up the Organization for Economic Cooperation and Development (OECD).[1]

Around the same time that incidence of chronic diseases climbed, we recognized that prevention is the best medicine. Consequently, a fitness and wellness movement developed gradually, beginning in the 1980s. Gyms and fitness centers as we know them began to be common across the country. People began to realize that good health is mostly self-controlled and that the leading causes of premature death and illness can be prevented by adhering to positive lifestyle habits.

Widespread interest in **health** and preventive medicine is motivating people to reexamine the foods they eat, incorporate more movement into activities of daily life, participate in organized fitness and wellness programs, and seek to reduce stress and increase well-being. We all desire to live a long life, and wellness programs aim to enhance the overall quality of life—for as long as we live.

1.2 Life Expectancy

Currently, the average life expectancy in the U.S. is 78.5 years (76.3 years for men and 80.7 years for women).[2] While the U.S. was once a world leader in life expectancy, over recent years, the increase in life expectancy in the U.S. has not kept pace with that of other developed countries. Based on 2020 data from the World Health Organization (WHO), the U.S. ranks 40th in the world for life expectancy (see Figure 1.5).[3] Japan ranks first in the world with an overall life expectancy of 84.3 years.

Several factors may account for the current U.S. life expectancy ranking, including the extremely poor health of some groups. The U.S. also has fairly high levels of violence (notably, homicides), rates of traffic fatalities, and suicide rates.[4] The current trend is a widening disparity between those in the U.S. with the highest and lowest life expectancy. For example, males in Fairfax County, Virginia can expect to live as long as males in Japan, while those in Bolivar County, Mississippi have the same life expectancy as males in countries with much lower life expectancies, like Pakistan. People with low socioeconomic status often lead more stressful lives, have more dangerous jobs,

Risk factors Lifestyle and genetic variables that may lead to disease.

Sedentary Description of a person who is relatively inactive and whose lifestyle is characterized by a lot of sitting.

Sedentary death syndrome (SeDS) Cause of deaths attributed to a lack of regular physical activity.

Hypokinetic diseases *Hypo* denotes "lack of"; therefore, illnesses related to lack of physical activity.

Health State of complete well-being—not just the absence of disease or infirmity.

have less access to healthy food, are more likely to be exposed to environmental toxins, and live in neighborhoods that are not as safe or as conducive to physical activity. In addition to having lower life expectancy, people with low socioeconimc status spend more of their final years in disability. A healthy lifestyle, on average, adds 5 to 6 years of disability-free life.[5]

The Gender Gap in Life Expectancy

Life expectancy for men in the U.S. is about 4.5 years lower than for women. For years it had been assumed that the difference is based on biology, but we are learning that 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. The decrease in the gender gap is thought to be due to the fact that women are increasingly taking on jobs, habits, and stressors of men, including drinking and employment outside the home. Women with heavy work schedules, however, are at higher risk than men who have similar work schedules when it comes to heart disease, cancer, and diabetes—most likely because women tend to take on additional stressors at home.[6] Women and men are also becoming more similar to one another in their risk factors for heart disease, such as obesity and diabetes.

Men, nonetheless, still report higher stress on the job and are less likely to engage in stress management programs. Men also work in some of the most dangerous jobs (logging workers, fishers and related fishing workers, aircraft pilots and flight engineers, roofers). In terms of work-related deaths, the fatality rate for men is about 10 times that of women.[7] Furthermore, men's health is not given the same degree of attention in terms of public health policies. Thus, men need to take a more proactive role in managing their own health, yet, unfortunately, this can be hard for them.

A culture of "masculinity" is also partially to blame. Studies have consistently shown that men are less likely to visit a physician when something is wrong and are less likely to have preventive care visits to be screened for potential risk factors such as hypertension, elevated cholesterol, diabetes, obesity, substance abuse, and depression or anxiety.[8] It is a troubling paradox, considering that men are at greater risk for each of the top risk factors for chronic disease. As a result, chronic diseases in men are often diagnosed at a later stage, when a cure or adequate management is more difficult to achieve. Men also drive faster than women and are more likely to engage in risk-taking activities.[9]

The Need to Prevent Disease, Not Only Cure It

The U.S. 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 six in ten adults in the U.S. have at least one chronic disease and four in ten have two or more chronic conditions.[10] Most of these patients do not receive the preventative recommendations to avoid disease.

A report by the OECD found that while the U.S. far outspent every other country in health care cost per capita, it also easily had the highest rates of obesity of all 45 OECD countries.[11] 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.[12] Today, nearly half of the people in the U.S. have diabetes or prediabetes.[13] Diabetes is the third most expensive chronic disease to treat, preceded only by heart disease and hypertension, respectively. All three of these chronic conditions are linked with obesity. Additional information on the obesity epidemic and its detrimental health consequences is given in Chapter 5.

1.3 Leading Health Problems in the United States

The leading causes of death in the United States today are largely related to lifestyle and personal choices (Figure 1.6). The U.S. Centers for Disease Control and Prevention (CDC) have found that 7 of 10 Americans die of preventable chronic diseases. Based on 2018 statistics, the latest official numbers released by the CDC, more than 50 percent of all deaths in the U.S. are caused by cardiovascular disease and cancer (see Figure 1.2). The third and fourth leading causes are accidents and chronic lower respiratory disease. From the age 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.[14]

The year 2020 has gone down in history as the year of the global spread of coronavirus disease, a severe acute respiratory syndrome caused by coronavirus 2 (SARS-CoV-2). The first case was identified in Wuhan, China in December 2019. The disease has been named coronavirus disease 2019, abbreviated COVID-19. The "CO" in COVID-19 stands for corona, "VI" for virus, "D" for disease, and 19 for the year 2019 when the first case was reported. Provisional data released by the CDC in March of 2021 reported that COVID-19 was the third leading cause of death in the U.S. in 2020, with approximately 375,000 deaths. That figure, however, escalated significantly in 2021, with more than 820,000 deaths from the start of the pandemic to the end of 2021. By all predictions, the number of deaths from COVID-19 will decrease significantly during the next few years.

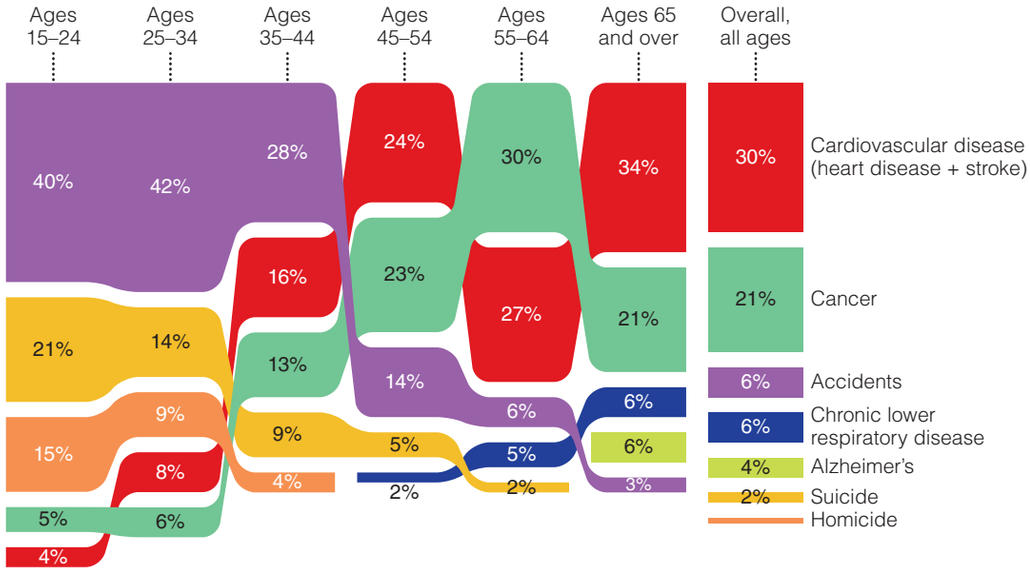
Hoeger Key To Wellness

Scientists believe that a healthy lifestyle program has the power to prevent almost 80 percent of deaths from cardiovascular disease and cancer.

Diseases of the Cardiovascular System

The most prevalent degenerative diseases in the U.S. are those of the cardiovascular system. The umbrella of **cardiovascular diseases** includes such conditions as **coronary heart disease (CHD)**, **heart attacks**, and **strokes** (sometimes referred to as brain attacks because, like heart attacks, strokes occur when oxygen-rich

Figure 1.6 Leading causes of death in the United States by age.



SOURCE: Centers for Disease Control and Prevention, "Deaths, Final Data, 2018."

Healthy Habits That Cut the Risk for Serious Disease

According to the Centers for Disease Control and Prevention, five health 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.
- Don't ever smoke or use any other tobacco products.
- Eat a healthy diet (ample fruits and vegetables, whole-grain products, and low meat consumption).
- Maintain a body mass index (BMI) of less than 30.
- Reduce the amount of time you spend sitting each day.

blood is blocked from reaching cells). According to the American Heart Association (AHA), more than one in three adults in the U.S. are afflicted with diseases of the cardiovascular system, including hypertension (high blood pressure) and CHD.

Slightly over 30 percent of all deaths in 2018 were caused by diseases of the cardiovascular system. As we gained understanding of the effects of lifestyle on chronic disease, more people participated in wellness programs, and cardiovascular mortality rates dropped. The decline began in about 1963, and between 1969 and 2018, the incidence of heart disease dropped by approximately 70 percent and the incidence of stroke by 80 percent.[15] The decrease is credited to higher levels of wellness and better treatment modalities in the U.S. A complete cardiovascular disease prevention program is outlined in Chapter 11.

Cancer

The second overall leading cause of death in the U.S. is cancer. About 21 percent of all deaths in the U.S. are attributable to cancer.[16] Cancer is closing the gap to soon become the leading cause of death in the U.S. One reason for this change may be that increased

Cardiovascular disease The array of conditions that affect the heart (cardio-) and the blood vessels (-vascular); often used interchangeably with the term *heart disease*. Under the cardiovascular disease umbrella are diseases including stroke and coronary heart disease (CHD). CHD, in turn, is an umbrella term for diseases that affect the heart and coronary arteries, which includes heart attacks.

Coronary heart disease (CHD) A disease in which plaque builds up in the arteries that supply blood to the heart (these are the coronary arteries; the term "coronary" evolved from the word for "crown or wreath," referring to the arteries that circle the heart).

Heart attack Damage to an area of the myocardium (heart muscle) that is deprived of oxygen, usually due to blockage of a diseased coronary artery.

Stroke A condition in which a blood vessel that feeds the brain is clogged, leading to blood flow disruption to the brain. Sometimes referred to as a brain attack.

rates of obesity lead to increased risk for both cancer and cardiovascular disease, but treatment for cardiovascular disease is not as difficult and complex as cancer treatment.

The major contributor to the increase in the incidence of cancer deaths during the past five decades is smoking, which accounts for almost 30 percent of all deaths from cancer. Another 30 percent of deaths are related to nutrition, physical inactivity, excessive body weight, and other faulty lifestyle habits.[17]

The American Cancer Society maintains that the most influential factor in fighting cancer today is prevention through health education programs. Lifestyle choices at a young age affect cancer risk throughout a lifetime. A comprehensive cancer-prevention program is presented in Chapter 12.

Chronic Lower Respiratory Disease

Chronic lower respiratory disease (CLRD), the third leading cause of death, is a general term that includes chronic obstructive pulmonary disease, emphysema, and chronic bronchitis (all diseases of the respiratory system). Although CLRD is related mostly to tobacco use or exposure (see Chapter 13 for discussion on how to stop smoking), nonsmokers also can develop CLRD.

Precautions to prevent CLRD include consuming a low-fat, low-sodium, nutrient-dense diet; staying physically active; not smoking and not breathing cigarette smoke; getting a pneumonia vaccine if older than age 50 and a current or ex-smoker; and avoiding swimming pools if sensitive to chlorine vapor.

Accidents

Accidents are the fourth overall leading cause of death and the leading cause of death until age 44. Even though not all accidents are preventable, many are. Consider automobile accidents, the leading cause of death for teens. Across the U.S., 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.[18]

Most people do not perceive accidents as a health problem. Even so, accidents affect the total well-being of millions of Americans each year. Accident prevention and personal safety are part of a health-enhancement program aimed at achieving a better quality of life. Hours spent exercising at the gym are of little help if the person is involved in a disabling or fatal accident as a result of distraction or making a single reckless decision.

Accidents do not just happen. We cause accidents, and we are victims of accidents. Although some factors in life, like natural disasters, are completely beyond our control, more often than not, personal safety and accident prevention are a matter of common sense. Most accidents stem from poor judgment and confused mental states, which occur when people are upset, mentally spent, not paying attention to the task at hand, trying to do too much at once, or abusing alcohol or other drugs.

With the advent of cell phones, distracted driving accidents have climbed. For teens, specifically, more than half of all moderate to severe automobile accidents result from driver distraction.[19] As the Senior Director of Transportation Strategic Initiatives for the National Safety Council, David Teater, put it, "You never think it will happen to you—until it does." Teater's research has been motivated by the loss of his 12-year-old son in a cell phone–related accident. Research utilizing brain imaging has uncovered the cognitive workload and collision risk during multiple driving scenarios (see *Distracted Driving* on page 9).

Alcohol abuse is the number-one overall cause of all accidents. About half of accidental deaths and suicides in the U.S. are alcohol related. Further, alcohol intoxication remains the leading cause of fatal automobile accidents in the U.S., taking the lives of 30 people every day. Other commonly abused drugs alter feelings and perceptions, generate mental confusion, and impair judgment and coordination, greatly enhancing the risk for accidental **morbidity** (Chapter 13).

Morbidity A condition related to or caused by illness or disease.

Medical Error in U.S. Hospitals: An Untracked Mortality Risk

Recently, attention has been brought to the number of deaths that are a direct result of medical error in U.S. hospitals. When cause of death is recorded by the CDC, medical error is not offered as an option; however, an estimated 250,000 deaths each year are the result of a mistake of omission or commission by medical workers.[20] While nothing can guarantee perfect medical care, it is ideal for every hospitalized patient to have an attentive and vocal advocate, and of course to lead a wellness lifestyle to avoid preventable health complications in the first place.

1.4 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. But we did not always understand the relationship between physical activity and mortality rates—in particular, the dose–response relationship.

During the second half of the 20th century, scientists began to realize the importance of good fitness and improved lifestyle in the fight against chronic diseases, particularly those of the cardiovascular system. Because of more participation in wellness programs, cardiovascular mortality rates dropped.

Furthermore, several studies showed an inverse relationship between physical activity and premature mortality rates. The first major study in this area was conducted in the 1980s among 16,936 Harvard alumni, and the results linked physical activity habits and mortality rates.[21] As the amount of weekly physical activity increased, the risk for cardiovascular deaths decreased.

The most significant research study of the last 50 years looking at the relationship between physical activity and death rates from different causes was conducted at the Aerobics Research Institute in Dallas.[22] This landmark study upheld the findings

Distracted Driving

Automobile accidents are the number-one cause of death for teens in the U.S. Studies on distracted driving have used new technology, including real-time brain imaging, to offer new insight about protecting ourselves behind the wheel. Following are insights for drivers.

1. *Listening to the radio is nearly as safe as driving with no distractions.*
2. *Having a cell phone conversation increases collision incidence.* The risk is identical for a hands-free device and a hand-held phone.
3. *Having a cell phone conversation causes the brain to screen out 50 percent of visual cues*. The ability to look directly at but not "see" an object is termed "inattention blindness." It is not uncommon for a distracted driver running a red light to collide with the second or third car in an intersection, having not "seen" the first cars. Talking on a phone while driving decreases reaction time to pedestrians in a crosswalk.
4. *Having a conversation with an adult passenger is safer than having a conversation on a cell phone*. Passengers who are experienced drivers help the driver by pausing conversation and by pointing out cues as needed. For a teen driver, the incidence of collision resulting in death increases with the number of teen passengers.
5. *Though crash risk is lower when talking with a passenger, cognitive workload can be the same as when talking on a cell phone*. The topic of conversation and emotional involvement affect safety in both types of conversation.
6. *The brain does not multitask, but rather switches attention between tasks*. Some dual tasks do not cause a problem; others do. When driving and holding a conversation, the brain often recognizes conversation as the primary task. Switching is a complex process that requires events to be committed to short-term memory before they can be "encoded," the stage when the brain chooses what to "see." It is not uncommon for switching time to be tenths of a second, the difference of several car lengths when braking. This is termed "reaction time switching costs."
7. *The brain remains somewhat distracted for up to 27 seconds following a phone conversation, text, or voice technology interaction*.[a]
8. *Because the majority of trips do not involve a situation that requires split-second timing, drivers can gain a false sense of security about being able to multitask*.
9. *Making a left turn while talking on a cell phone or hands-free device is among the most dangerous driving activities*.
10. *Reaching for a moving object or turning in your seat increases collision incidence by eight to nine times*.

Anton Jansson/Unsplash

11. *Texting while driving increases collision incidence by 16 times*. Talking is the cause of more deaths than texting because, compared with texting, drivers talk on a cell phone more frequently for longer lengths of time. Consider using your phone's "do not disturb" setting or an app that blocks texting while driving. Because our minds are social and curious, we find text alerts difficult to ignore. Pedestrians who are distracted by their phones also increase their chances of being a victum of a fatal car accident.
12. *Sleepy drivers kill more than half as many Americans as drunk drivers*. More than 6,000 people die each year in the U.S. in crashes attributed to drowsy drivers. In comparison, roughly 10,000 people die each year because of drunk or buzzed driving.
13. *Parents driving children are just as likely to talk on the phone and use distractions, including navigation systems, as other drivers*.[b]

We cannot control what information our brain chooses to encode and screen out while driving. We can control our decision to use a cell phone or to speak up when a driver is putting passengers in danger.

[a]"Up to 27 Seconds of Inattention after Talking to Your Car or Smartphone," The University of Utah UNews, October 27, 2015, available at http://unews.utah.edu/up-to-27-seconds-of-inattention-after-talking-to-your-car-or-smart-phone/.

[b]Michelle L. Macy, Patrick M. Carter, C. Raymond Bingham, Rebecca M. Cunningham, and Gary L. Freed, "Potential Distractions and Unsafe Driving Behaviors Among Drivers of 1- to 12-Year-Old Children," *Academic Pediatrics* 14, no. 3 (2014): 279.

of the Harvard alumni study. Based on data from 13,344 people followed over an average of 8 years, the study revealed a graded and consistent inverse relationship between physical activity levels and mortality, regardless of age and other risk factors.

A most significant finding of this study was the large drop in all-cause, cardiovascular, and cancer mortality when individuals went from low fitness to moderate fitness—a clear indication that moderate-intensity physical activity, achievable by most adults, provides considerable health benefits and extends life. This relationship between physical activity and premature mortality is illustrated in Figure 1.7. The data also revealed that the participants attained more protection by combining higher fitness levels with reduction in other risk factors such as hypertension, serum cholesterol, cigarette smoking, and excessive body fat. Countless studies since have upheld these results and have established that as physical activity increases, overall mortality rate decreases. Research has also corroborated that the biggest drop in mortality rate happens when inactive people become moderately active.

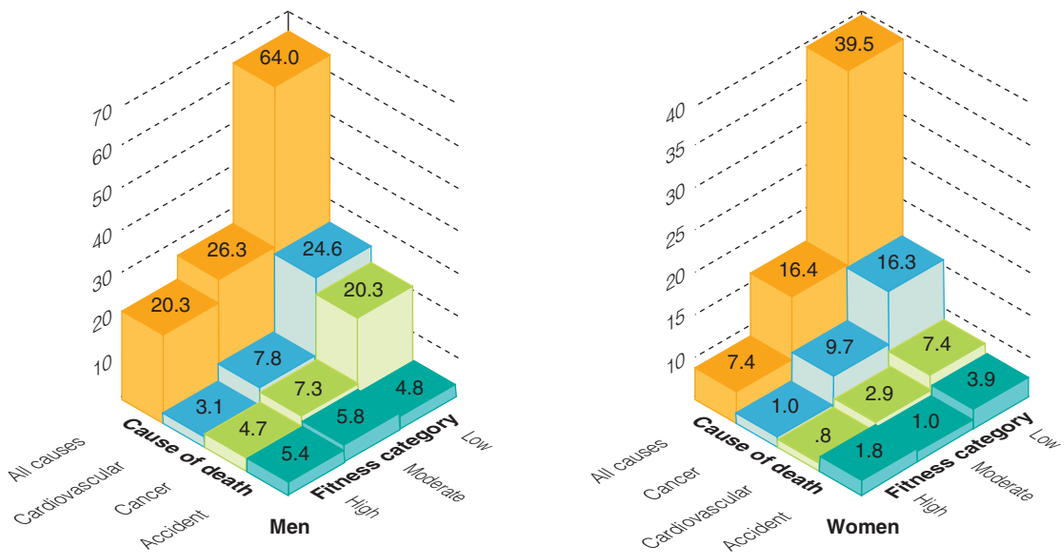
One study looked to specifically compare the efficacy of commonly prescribed drugs against the impact of regular exercise. The data are based on more than 14,000 patients recovering from stroke, being treated for heart failure, or looking to prevent type 2 diabetes or a second episode of CHD. The study looked at the effectiveness of exercise versus drugs on health outcomes. The results were revealing: Exercise programs were more effective than medical treatment in stroke patients and equally effective as medical treatments in prevention of diabetes and CHD. Only in the prevention of heart failure were diuretic drugs more effective in preventing mortality than exercise.

When physical activity is combined with other healthy lifestyle factors, it becomes clear that individual lifestyle choice is the strongest predictor of longevity. In particular, regular daily physical activity, never using tobacco in any form, healthy nutrition, and maintenance of recommended body weight are among the most significant health factors a person can adopt to prevent chronic disease and premature mortality.

While it is clear that moderate-intensity exercise does provide substantial health benefits, research data also show a dose–response relationship between physical activity and health. That is, greater health and fitness benefits occur at higher duration and/or intensity of physical activity. Vigorous activity and longer duration are preferable to the extent of one's capabilities because they are most clearly associated with better health and longer life. Current recommendations suggest that a person accumulate a minimum of 150 minutes of moderate-intensity physical activity each week. For an inactive person, following this guideline is the most important step toward improving health. Once a person is regularly achieving this weekly minimum, the next step toward improving health through physical activity is to replace at least one-third of weekly moderate physical activity with vigorous physical activity.[23] Further, there is no increase in mortality risk when people participate in a large volume of moderate or vigorous-intensity activity each week. Benefits in decreased mortality risk continue to increase until a person reaches three to five times the recommended weekly minimum of 150 minutes, at which point, benefits in decreased mortality risk plateau.[24]

As compared with prolonged moderate-intensity activity, vigorous-intensity exercise has been shown to provide the best

Figure 1.7 Death rates by physical fitness groups. (Numbers on top of the bars are all-cause death rates per 10,000 person years of follow-up for each cell; 1 person-year indicates one person who was followed up 1 year later.)



SOURCE: Based on Data from S. N. Blair, H. W. Kohl III, R. S. Paffenbarger, Jr., G. G. Clark, K. H. Cooper, and L. W. Gibbons, "Physical Fitness and All-Cause Mortality: A Prospective Study of Healthy Men and Women," *Journal of the American Medical Association* 262 (1989): 23952401.

improvements in aerobic capacity, CHD risk reduction, and overall cardiovascular health. A word of caution, however, is in order. Vigorous exercise should be reserved for healthy individuals who have been cleared for it (Lab 1C).

Exercise Is Medicine

In order to help the public better appreciate the true benefits of exercise, the American College of Sports Medicine (ACSM) and the American Medical Association (AMA) provide a nationwide "Exercise Is Medicine" program.[25] The initiative calls on all physicians to assess and review every patient's physical activity program at every visit. "Exercise is medicine and it's free." All physicians should be prescribing exercise to all patients and participating in exercise themselves. Currently, physicians and other professionals in the health field receive little training in exercise science and its practical clinical application. The prevalent approach of largely ignoring exercise in the health profession is an outdated way of practicing medicine.

1.5 Additional Benefits of a Comprehensive Fitness Program

Regular physical activity 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 quality of life into old age.

An inspiring story illustrating what fitness can do for a person's health and well-being is that of George Snell from Sandy, Utah. At age 45, Snell weighed approximately 400 pounds, his blood pressure was 220/180, he was blind because of undiagnosed diabetes, and his blood glucose level was 487.

Snell had determined to do something about his physical and medical condition, so he started a walking/jogging program. After about 8 months of conditioning, he had lost almost 200 pounds, his eyesight had returned, his glucose level was down to 67, and he was taken off medication. Just 2 months later—less than 10 months after beginning his personal exercise program—he completed his first marathon, a running course of 26.2 miles!

Health Benefits

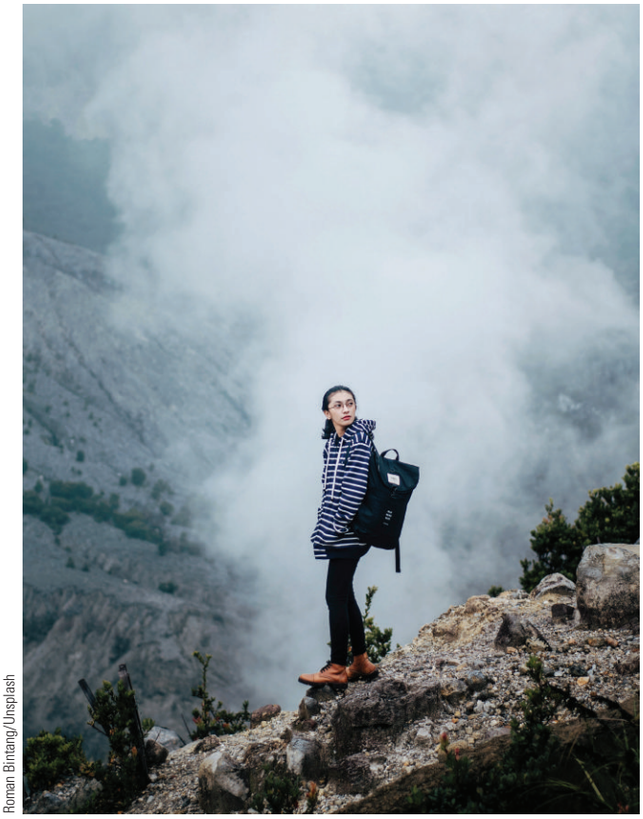
Most people exercise because it improves their personal appearance and makes them feel good about themselves. Although many benefits accrue from regular fitness, the greatest benefit of all is that physically fit individuals enjoy a better quality of life. These people live life to its fullest, with far fewer health problems than inactive individuals.

The benefits derived by regularly participating in exercise are so extensive that it is difficult to compile an all-inclusive list. Many of these benefits are summarized in Figure 1.8. As far back as 1982, the American Medical Association indicated that "there is no drug in current or prospective use that holds as much promise for sustained health as a lifetime program of physical exercise."

While most of the chronic (long-term) benefits of exercise are well-established, what many people fail to realize is that there are immediate benefits derived by participating in just a single bout of exercise. Most of these benefits dissipate within 48 to 72 hours following exercise. The immediate benefits, also summarized in Figure 1.8, are so striking that they prompted Dr. William L. Haskell of Stanford University to state, "Most of the health benefits of exercise are relatively short term, so people should think of exercise as a medication and take it on a daily basis." Of course, if you regularly exercise a minimum of 30 minutes five times per week and maintain a certain amount of physical activity throughout the day, you will realize the impressive long-term benefits listed in Figure 1.8.

Exercise and Brain Function

Exercise changes the way we learn. Many scientists believe that exercise alters the chemistry of the brain to make it more receptive and malleable while learning. Physical activity is related to better cognitive health and effective functioning across the lifespan. Even in 400 BCE, the Greek philosopher Plato stated, "In order for man to succeed in life, God provided him with two means, education and physical activity. Not separately, one for the soul and the other for the body, but for the two together. With these two means, man can attain perfection."



Roman Bintang/Unsplash

No current drug or medication provides as many health benefits as a regular physical activity program.

Figure 1.8 Long- and short-term benefits of exercise.

Immediate (Acute) Benefits of Exercise
(Expect a number of benefits as a result of a single exercise session. Some of these benefits last as long as 72 hours following your workout.)

- improves and strengthens the cardiorespiratory system.
- maintains better muscle tone, muscular strength, and endurance.
- improves muscular flexibility.
- enhances athletic performance.
- helps achieve peak bone mass in young adults and maintain bone mass later in life, thereby decreasing the risk for osteoporosis.
- helps prevent chronic back pain.
- speeds recovery time following physical exertion.
- speeds recovery following injury or disease.
- improves posture and physical appearance.

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

- regulates and improves overall body functions.
- retards creeping frailty, reduces disability, and helps to maintain independent living in older adults.
- improves functioning of the immune system.
- lowers the risk for chronic diseases and illnesses (including heart disease, stroke, and certain cancers).
- decreases the mortality rate from chronic diseases.
- thins the blood so that it doesn't clot as readily, thereby decreasing the risk for coronary heart disease and stroke.
- helps the body manage blood lipid (cholesterol and triglyceride) levels more effectively.
- prevents or delays the development of high blood pressure and lowers blood pressure in people with hypertension.
- helps prevent and control type 2 diabetes.
- extends longevity and slows the aging process.

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

- helps people sleep better.
- relieves tension and helps in coping with life stresses.
- raises levels of energy and job productivity.
- promotes psychological well-being, including higher morale, self-image, and self-esteem.
- reduces feelings of depression and anxiety.
- encourages positive lifestyle changes (improving nutrition, quitting smoking, controlling alcohol and drug use).
- improves physical stamina and counteracts chronic fatigue.
- enhances quality of life: People feel better and live a healthier and happier life.

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Long-term Benefits of Exercise
(Regular participation in exercise.)

- increases heart rate, stroke volume, cardiac output, pulmonary ventilation, and oxygen uptake.
- begins to strengthen the heart, lungs, and muscles.
- enhances metabolic rate or energy production (burning calories for fuel) during exercise and recovery. (For every 100 calories you burn during exercise, you can expect to burn another 15 during recovery.)
- improves joint flexibility.
- decreases arthritic pain.

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

- uses blood glucose and muscle glycogen.
- improves insulin sensitivity (decreasing the risk of type 2 diabetes).
- immediately enhances the body's ability to burn fat.
- lowers blood lipids.
- reduces low-grade (hidden) inflammation.
- improves endothelial function. (Endothelial cells line the entire vascular system, which provides a barrier between the vessel lumen and surrounding tissue—endothelial dysfunction contributes to several disease processes, including tissue inflammation and subsequent atherosclerosis.)
- decreases blood pressure the first few hours following exercise.
- improves digestion.
- improves resistance to infections.

- improves brain function.

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

Data have shown a consistent and significant association between physical fitness and various indicators of academic achievement; in particular, higher levels of fitness were associated with better academic grades. Cardiorespiratory fitness was shown to have a dose-response association with academic performance (better fitness and better grades), independent of other sociodemographic and fitness variables. A review of 19 studies of young adults looked at the short-term boost of exercise on academics and found that students who had 20 minutes of exercise immediately preceding a test or giving a speech had higher academic performance and better focus than those who did not exercise.[26]

Emerging research shows that exercise allows the brain to function at its best through a combination of biological reactions. First, exercise increases blood flow to the brain, providing oxygen, glucose, and other nutrients and improving the removal of metabolic waste products. The increased blood and oxygen flow also prompts the release of the protein brain-derived neurotrophic factor (BDNF). This protein works by strengthening connections between brain cells and repairing any damage within them. BDNF also stimulates the growth of new neurons in the hippocampus, the portion of the brain involved in memory, planning, learning, and decision-making. The hippocampus is one of only two parts of the adult brain where new cells can be generated. The connections strengthened by BDNF are critical for learning to take place and for memories to be stored. Exercise provides the necessary stimulus for brain neurons to interconnect, creating the perfect environment in which the brain is ready and able to learn.

Exercise also increases the neurotransmitters dopamine, glutamate, norepinephrine, and serotonin, all of which are vital in the generation of thought and emotion. Low levels of serotonin have been linked to depression, and exercise has repeatedly been shown to be effective in treating depression.

The hippocampus tends to shrink in late adulthood, leading to memory impairment. In older adults, regular aerobic exercise has been shown to increase the size of the hippocampus and decrease the rate of brain shrinkage, dramatically minimizing declines in thinking and memory skills. One study found that older adults who followed a regular program of moderate to intense exercise had cognitive and memory skills that rated a decade younger than those of sedentary peers of the same age.[27] Physical activity, especially in middle and older age, appears to be the most important lifestyle change a person can make to prevent dementia and Alzheimer's later in life.[28]

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An active lifestyle increases health, quality of life, and longevity.

1.6 Sitting Disease

The human body requires time to recover (sit and sleep) from labor, tasks, and other typical daily activities. Most Americans, however, sit for way too many hours each day. On *average*, people spend about 8 hours per day or more of their waking time sitting. Prolonged sitting is unnatural to the body, and we now know that too much sitting is hazardous to human health and has a direct link to premature mortality. Although not recognized by the medical community as a diagnosable illness, the scientific community has coined the term "sitting disease" as a chronic 21st-century disease.

The data indicate that the risks that come with sitting are independent from those related to physical activity levels. They suggest that, like the gas and brake pedals on a car, physical activity and prolonged sitting each act upon human physiology in their own, independent way. Therefore, even individuals who exercise five times per week for at least 30 minutes per session but otherwise spend most of the day sitting are accruing health risks.

Prolonged sitting is a major risk factor for disease. Excessive sitting leads to the development of metabolic problems, including reduced insulin sensitivity and increased abdominal fat.[29] Our bodies are simply not designed for extended periods of sitting. As we sink into inactivity, our biological processes begin to change, down to a cellular and molecular level. Researchers are only beginning to understand all of the factors at work, but studies show, for example, that blood flow becomes sluggish and is more likely to form life-threatening clots in the lungs and legs. Arteries lose flexibility and have a lower capacity to expand and relax. Slower blood flow means less oxygen and glucose delivered to the brain and body and, as a result, cognitive function declines and the feeling of fatigue increases. Additionally, during extended sitting, fat deposits accumulate in muscle cells, which interferes with insulin's ability to transport glucose into muscle cells. (When a person is active, **skeletal muscles** are responsible for 80 percent of glucose disposal.) Thus, insulin resistance increases along with the accompanying risk for diabetes and cardiovascular disease.

Skeletal muscle The type of muscle that powers body movement.

When you are sitting, the level of triglycerides (a type of fat found in your blood) jumps because inactive muscles also stop producing the enzyme lipoprotein lipase that usually captures these fats from the blood to turn them into fuel. Even HDL cholesterol levels (the good cholesterol) drop by 20 percent after as little as 1 hour of uninterrupted sitting.

When we are sitting, some of the largest muscles in our body, including leg and hip muscles, are relaxed and inactive. By simply standing up, we immediately activate these muscles. They work to keep us upright, requiring blood sugar to fuel themselves. They further release the enzyme that captures triglycerides from the blood to help keep blood lipid levels in check and also help regulate other metabolic processes. The simple act of repeatedly standing and moving throughout the day can change disease risk. Further, remaining inactive following meals makes blood glucose levels spike. A slow stroll after a meal can cut this blood glucose spike in half. Inactivity further appears to switch on or off dozens of genes that trigger additional risk factors.

Death rates are high for people who spend most of their day sitting, even though they meet the minimum physical activity recommendations on a weekly basis. The data show that:

- Too much sitting speeds biological aging by up to 8 years.
- People who spend most of their day sitting have as much as a 50 percent greater risk of dying prematurely from all causes. Excessive sitting is the "new smoking." The risk of a heart attack in people who sit most of the day is almost the same as that of smokers.
- Prolonged daily sitting time is an underestimated risk factor for cancer. Too much sitting has been estimated to cause 91,000 cancer deaths each year in the U.S. alone (49,000 breast cancers and 42,000 colon cancers).
- Less sitting means greater comfort. Individuals who reduce sitting time throughout the day report feeling less fatigued and more energetic, focused, productive, and comfortable and reported less back and neck pain. Most people do not realize how much time they spend sitting on a given day.

Think about the seats you sit in every day and how much time you spend in each (see Figure 1.9). We can easily accumulate 8 to 12 sitting hours and spend the majority of our day in the seated position, with only the chair beneath us changing.

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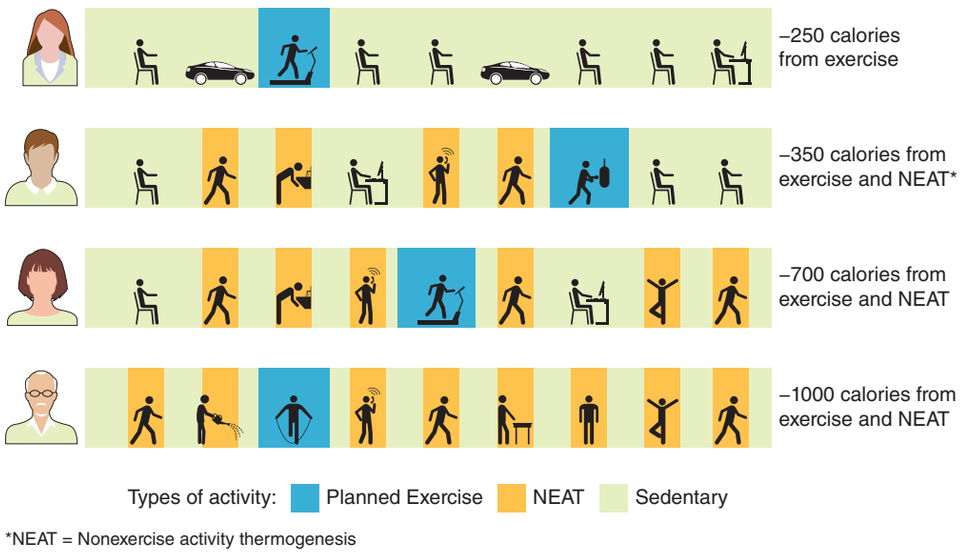
By being more active throughout the day and avoiding excessive sitting, people can increase their daily energy (caloric) expenditure by the equivalent of a 7-mile run. They will also increase years of healthy life expectancy.

You can fight sitting disease by taking actions to break up periods of inactivity and by becoming more physically active. The key is to sit less and move more. To minimize inactivity when you have limited time and space, look for opportunities to increase daily physical activity:

- Walk or bike instead of drive for short distances.
- Park farther or get off public transit several blocks from the campus or office. At the office, walk to the farthest bathroom rather than the nearest.
- Take a short walk after each meal or snack. Stand up and move for 1 minute every time you take a drink of water.
- Walk faster than usual.
- Take the stairs often.
- When watching a show, stand up and move during each commercial break, or even better, stretch or work out while watching. When working or watching a show, drink plenty of water, which is not only healthy on its own but will give you extra reasons to take a walk for refills and bathroom breaks.
- Do not shy away from housecleaning chores or yard work, even for a minute or two at a time.

Figure 1.9 The importance of nonexercise activity thermogenesis (NEAT) and exercise.



*NEAT = Nonexercise activity thermogenesis

- Stand more while working/studying. Place your computer on an elevated stand or shelf.
- Make it a habit to stand or pace while talking on the phone.
- Make it a habit to walk or pace when you need to puzzle through a problem. Put to work the advice of the western philosopher Friedrich Nietzsche: "All truly great thoughts are conceived while walking."
- Break up sitting by closing your office door, if possible, and spending 1 minute doing a full-body exercise, such as holding a plank position or doing slow squats into and out of your chair.
- When you accomplish a difficult task at work or while during homework, stand up and give yourself a mini victory parade or victory dance.
- When reading a book, get up and move after every 6 to 10 pages of the book.
- Use a stability ball for a chair. Such use enhances body stability; balance; and abdominal, low back, and leg strength.
- Whenever feasible, walk while conversing or holding meetings. If meetings are in a conference room, take the initiative to stand. Make telephone conference calls an opportunity for a stroll.
- Walk to classmates' homes or coworkers' offices to study or discuss matters with them instead of using your phone.

Researchers are still working to come to a consensus about the ideal prescription of activity to break up sitting. The best current guideline seems to be to stand and move after every 20 minutes of inactivity and to take intermittent 5-minute breaks for every half hour that you are at the computer, studying, or participating in any type of uninterrupted sitting. Stretching, walking around, or talking to others while standing or walking is beneficial and increases oxygen flow to the brain, making you more effective, creative, and productive.

1.7 Physical Activity and Exercise Defined

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

Physical activity is bodily movement produced by skeletal muscles. It requires energy expenditure and produces progressive health benefits. Physical activity can be of light intensity or moderate to vigorous intensity. Examples of daily **light physical activity** include walking to and from work, taking the stairs instead of elevators and escalators, grocery shopping, and doing household chores. Physical inactivity, by contrast, implies a level of activity that is lower than that required to maintain good health.

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

To better understand the impact of all intensities of physical activity, scientists created a new category of movement called **nonexercise activity thermogenesis (NEAT)**. 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 may expend 1,300 calories on an average day 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 the overall daily activity level is high. An active person can vary calories from day to day with fewer swings in body weight, whereas a sedentary person who changes caloric intake will

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.

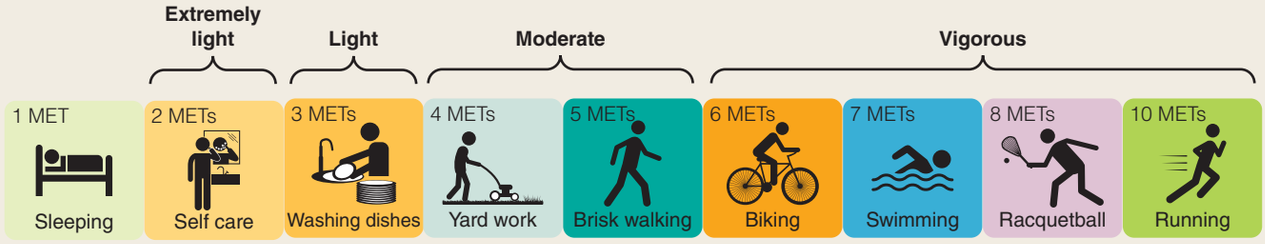
Physical activity Bodily movement produced by skeletal muscles, which requires expenditure of energy and produces progressive health benefits. Examples include walking, taking the stairs, dancing, gardening, working in the yard, cleaning the house, shoveling snow, washing the car, and all forms of structured exercise.

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

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

Light, Moderate, and Vigorous Physical Activity

Adults should do 150 minutes a week of moderate-intensity physical activity, 75 minutes a week of vigorous-intensity physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity. Adults should also strive to incorporate light physical activity into daily life as often as possible. Intensity of physical activity can be measured in METs. *MET* stands for *metabolic equivalent*. The baseline measurement is a single MET. One MET is the amount of oxygen utilized by a person when resting. An activity that has the intensity of two METs utilizes double that amount of oxygen. An activity that has the intensity of three METs utilizes triple, and so on.



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. People who spend most of the day working on their feet, such as a medical assistant or a stay-at-home parent, easily expend 700 additional daily calories compared to a person with a sedentary desk job. People with physically demanding jobs, such as construction workers, can easily burn between 1,000 and 2,000 more daily calories than a sedentary worker.

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 is **vigorous physical activity**. Variations in NEAT add up over days, months, and years and provide substantial benefits with weight management and health.

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.

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. 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.

1.8 Types of Physical Fitness

As the fitness concept grew, it became clear that several specific components contribute to an individual's overall level of fitness. **Physical fitness** is classified into health-related and performance-related fitness.

Health-related fitness relates to the ability to perform activities of daily living without undue fatigue. The health-related fitness components are cardiorespiratory (aerobic) endurance, muscular fitness (muscular strength and endurance), muscular flexibility, and body composition (Figure 1.10).

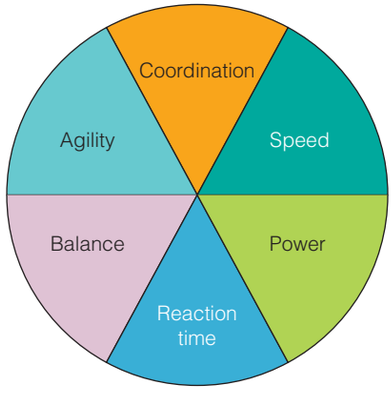
Critical Thinking

What role do the four health-related components of physical fitness play in your life? Rank them in order of importance to you and explain the rationale you used.

Performance-related fitness components consist of agility, balance, coordination, reaction time, speed, and power (Figure 1.11). These components are related primarily to successful sports and motor skill performance. Participating in performance-related activities contributes to physical fitness, but in terms of general **health promotion** and wellness, the main emphasis of physical fitness programs should be on the health-related components.

Figure 1.10 Health-related components of physical fitness.

Figure 1.11 Performance-related components of physical fitness.



1.9 Fitness Standards: Health versus Physical Fitness

Our bodies adapt to the different types of physical activity we participate in, and the result is different levels of personal fitness. A meaningful debate regarding fitness standards has resulted in two widely recognized categories of fitness: health fitness standards (also referred to as *criterion referenced*) and physical fitness standards. Following are definitions of both. The assessment of health-related fitness is presented in Chapters 4 and 6 to 9, where appropriate physical fitness standards are included for comparison.

Health Fitness Standards

The **health fitness standards** proposed here are based on data linking minimum fitness values to disease prevention and health. Attaining the health fitness standard is conducive to a low risk of premature hypokinetic diseases and requires only moderate physical activity. For example, a 2-mile walk in less than 30 minutes, five or six times a week, seems to be sufficient to achieve the health fitness standard for cardiorespiratory endurance.

As illustrated in Figure 1.12 and as discussed earlier, significant health benefits can be reaped with such a program. These benefits include a reduction in blood lipids, lower blood pressure, weight loss, stress release, less risk for diabetes, and lower risk for disease and premature mortality. Fitness improvements, expressed in terms of maximum oxygen uptake, or VO_{2max} (explained next and in Chapter 6), are not as notable. Nevertheless, health improvements are quite striking.

More specifically, improvements in the **metabolic profile** (measured by insulin sensitivity, glucose tolerance, and improved cholesterol levels) can be notable despite little or no weight loss or improvement in aerobic capacity. Metabolic

Vigorous physical activity Any exercise that requires a MET level equal to or greater than 6 METs (21 mL/kg/min). One MET is the energy expenditure at rest, 3.5 mL/kg/min, and METs are defined as multiples of this resting metabolic rate. (Examples of activities that require a 6-MET level include aerobics, walking uphill at 3.5 mph, cycling at 10 to 12 mph, playing doubles in tennis, and vigorous strength training.)

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

Physical fitness The ability to meet the ordinary, as well as unusual, demands of daily life safely and effectively without being overly fatigued and still have energy left for leisure and recreational activities.

Health-related fitness Fitness programs prescribed to improve the individual's overall health.

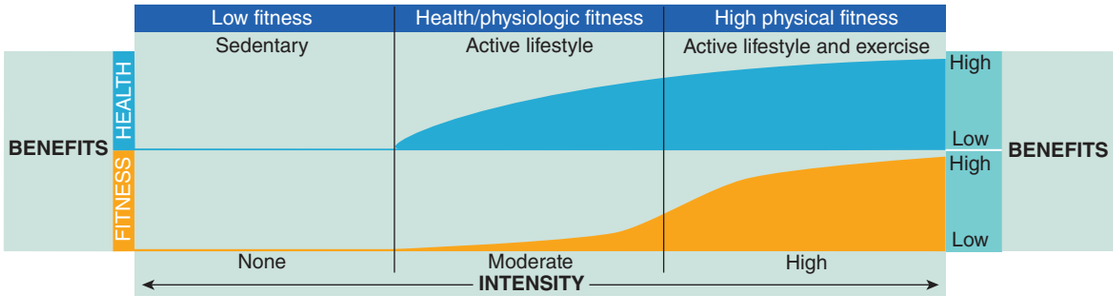
Performance-related fitness Fitness components important for success in skillful activities and athletic events: encompasses agility, balance, coordination, reaction time, speed, and power.

Health promotion The science and art of enabling people to increase control over their lifestyle to move toward a state of wellness.

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

Metabolic profile A measurement of plasma insulin, glucose, lipid, and lipoprotein levels to assess risk for diabetes and cardiovascular disease.

Figure 1.12 Health and fitness benefits based on the type of lifestyle and physical activity program.



SOURCE: Fitness & Wellness, Inc. Reprinted by permission.

fitness can be attained through an active lifestyle and moderate-intensity physical activity.

One way to determine a person's fitness level is by assessing his or her **cardiorespiratory endurance**, which can be expressed in terms of VO_{2max}. Essentially, as a person moves or exercises more, the body adapts so that it is able to take in more oxygen and better utilize the oxygen it takes in. Specific changes occur in the heart, lungs, and muscles to make this possible (see Chapter 6). The maximum (max) amount of oxygen (O_2) that a person is able to use is measured in volume (V) per minute of exercise. A person's VO_{2max} is commonly expressed in milliliters (mL) of oxygen (volume of oxygen) per kilogram (kg) of body weight per minute (mL/kg/min). Individual values of VO_{2max} can range from about 10 mL/kg/min in cardiac patients to more than 80 mL/kg/min in world-class runners, cyclists, and cross-country skiers.

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Individual VO_{2max} values can range from about 10 mL/kg/min in cardiac patients to more than 80 mL/kg/min in world-class athletes. Aim for values of 35 (men) and 32.5 mL/kg/min (women) to reach health fitness standards and benefit from metabolic fitness.

Research data from the study presented in Figure 1.7 reported that achieving VO_{2max} values of 35 and 32.5 mL/kg/min for men and women, respectively, may be sufficient to lower the risk for all-cause mortality significantly. Although greater improvements in fitness yield an even lower risk for premature death, the largest drop is seen between least fit and moderately fit individuals. Therefore, the 35 and 32.5 mL/kg/min values are selected as the health fitness standards.

Physical Fitness Standards

Physical fitness standards are set higher than health fitness standards and require a more intense exercise program. Physically fit people of all ages have the freedom to enjoy most of life's daily and recreational activities to their fullest potentials. Current health fitness standards may not be enough to achieve these objectives.

Sound physical fitness gives the individual a degree of independence throughout life that many people in the U.S. no longer enjoy. Most adults should be able to carry out activities similar to those they conducted in their youth, though not with the same intensity. These standards do not require being a championship athlete, but activities such as changing a tire, chopping wood, climbing several flights of stairs, playing basketball, mountain biking, playing soccer with children or grandchildren, walking several miles around a lake, and hiking through a national park do require more than the current "average fitness" level of most Americans.

Which Program Is Best?

Your own personal objectives will determine the fitness program you decide to use. If the main objective of your fitness program is to lower the risk for disease, attaining the health fitness standards will provide substantial health benefits. If, however, you want to participate in vigorous fitness activities, achieving a high physical fitness standard is recommended. This book gives both health fitness and physical fitness standards for each fitness test so that you can personalize your approach.

1.10 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.* These guidelines complement the current *Dietary Guidelines for Americans* (Chapter 3, page 97) and parallel the international recommendations issued by the WHO and recommendations issued by the ACSM and the AHA.

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 (see Table 1.1).[30]

Table 1.1 Physical Activity Guidelines

Benefits	Duration	Intensity	Frequency per Week	Weekly Time
Health	At least 30 min	MI*	5 times	150–300 min
Health and fitness	At least 25 min	VI*	3 times	75–150 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 or VI or a combination of the two

Phillip Belena/Unsplash

Good health-related fitness and performance-related fitness are required to participate in highly skilled activities.

Adults between 18 and 64 Years of Age

- All adults should move more frequently and sit less throughout the day. Any amount of physical activity provides some health benefits.
- Adults should do 150 minutes (2½ hours) to 300 minutes (5 hours) a week of moderate-intensity aerobic (cardiorespiratory) physical activity or 75 minutes (1 hour and 15 minutes) to 150 minutes (2½ hours) 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 and vigorous-intensity activity on another 2 days. Preferably, aerobic activity should be performed throughout the week.
- Additional health benefits are provided by increasing beyond the equivalent 300 minutes (5 hours) of moderate-intensity physical activity per week.
- Adults should also do muscle-strengthening activities that involve all major muscle groups on 2 or more days per week.

Older Adults (ages 65 and older)

- Older adults should follow the adult guidelines. If this is not possible due to limiting chronic conditions, older adults should be as physically active as their abilities allow. They should avoid inactivity. Older adults should do exercises that maintain or improve balance if they are at risk of falling.

Children 6 Years of Age and Older and Adolescents

- Children and adolescents should do 1 hour (60 minutes) or more of moderate- to vigorous-intensity physical activity every day. 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 at least 3 days per week.
- Children and adolescents should also do muscle-strengthening and bone-strengthening activities on at least 3 days per week.

Pregnant and Postpartum Women

- Healthy women who are not already doing vigorous-intensity physical activity should get at least 150 minutes (2 ½ hours) of moderate-intensity aerobic activity a week during pregnancy and the postpartum period. This activity should be spread throughout the week. Women who regularly engage in vigorous-intensity aerobic activity prior to pregnancy can continue their activity throughout pregnancy and the postpartum period, provided that their condition remains unchanged and they talk to their health care provider about their activity level throughout this time.

Cardiorespiratory endurance The ability of the lungs, heart, and blood vessels to deliver adequate amounts of oxygen to the cells to meet the demands of prolonged physical activity.

Physical fitness standards A fitness level that allows a person to sustain moderate-to-vigorous physical activity without undue fatigue and to closely maintain this level throughout life.

Because of the ever-growing epidemic of obesity in the U.S. and the world, adults are encouraged to increase physical activity beyond the minimum requirements and adjust caloric intake until they find their personal balance to maintain 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.

The *Physical Activity Guidelines for Americans* state that some adults should be able to achieve calorie balance with 150 minutes of moderate physical activity in a week, whereas others will find they need more than 300 minutes per week. This recommendation was based on evidence indicating that people who maintain a healthy weight typically accumulate 1 hour of daily physical activity.

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 additional activity per day provides additional health benefits, including a lower risk for cardiovascular disease and diabetes.

Critical Thinking

Do you consciously incorporate physical activity throughout the day into your lifestyle? Can you provide examples? Do you think you get sufficient daily physical activity to maintain good health?

1.11 Monitoring Daily Physical Activity

The majority of U.S. adults are not sufficiently physically active to promote good health. Only one in five U.S. adults 18 and over meet the federal physical activity guidelines for both aerobic and muscular fitness (strength and endurance) activities.

Activity Trackers

It is important to have an accurate idea of the level of activity you get in a day to establish a groundwork from which you build your fitness goals. An activity tracker, also known as a fitness tracker, is a device or an app (application) used to monitor and evaluate fitness-related metrics. You may face an initial shock, as many people have, when you see how little daily NEAT you accumulate, but remember that accurate data are the foundation for results. The first step is choosing the method you will use to track your activity, and today's options abound.

Both an **activity tracker** built specifically for this job and the average smartphone contain a device called an accelerometer. The accelerometer itself is an inexpensive device that simply indicates changes in movement (acceleration and deceleration). Activity trackers add an array of features to that functionality. In accuracy tests, accelerometers have shown an average 15 percent discrepancy from actual activity, a similar accuracy record to a good pedometer. Most are worn on the wrist (or even as a ring on your finger) versus the hip or foot. While wrist placement is not as accurate, most users find it most convenient.

Activity trackers seem to be best at recording straightforward actions that are part of daily physical activity such as brisk walking or jogging. However, they tend to be inaccurate when recording less rhythmic activities, vigorous exercise, overall calories burned, sleep, or other metrics. As you can imagine, a wrist-worn activity tracker will not do well measuring a grueling bike workout. Accelerometers tend to lose accuracy at a very slow walking speed (slower than 30 minutes per mile) because the movement of the wrist or vertical movement of the hip is too small. Users simply need to keep these limitations in mind.

If you opt for an activity tracker, be sure to check reliable reviews and weigh the features that are most important to you before purchasing. Consider what you should prioritize for your own lifestyle: accurate GPS tracking, long battery life, vibration alarms that prompt movement, the ability to download programs and connect to online support networks, or other features. Some companies offer different models depending on whether a user is interested in tracking daily activity or vigorous exercise. Be sure to follow instructions to calibrate the device to your personal stride.

Another option is to use the accelerometer in your smartphone with an activity app, which has been shown to be similar in accuracy to an activity tracker. Choose an app from a well-regarded health foundation or university.

Activity trackers help boost motivation to exercise. People who use such devices tend to incorporate more purposeful activity into their daily routine. A review (meta-analysis) of 28 different studies published in 2021 indicated that people who use an activity tracker, on average, increase daily physical activity and walk an extra 1,850 more steps per day (about an extra mile per day—see discussion that follows next on steps per day).[31]

Recommended Steps per Day

The typical American man takes about 6,000 steps per day; the typical woman takes about 5,300 steps. For years, the general recommendation for adults has been 10,000 steps per day, and

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Activity trackers can be used to monitor daily physical activity; the recommendation is a minimum of 10,000 steps per day.

Table 1.2 Adult Activity Levels Based on Total Number of Steps Taken per Day

Steps per Day	Category
<5,000	Sedentary lifestyle
5,000–7,499	Low active
7,500–9,999	Somewhat active
10,000–12,499	Active
≥12,500	Highly active

SOURCE: C. Tudor-Locke and D. R. Basset, "How Many Steps/Day Are Enough? Preliminary Pedometer Indices for Public Health," *Sports Medicine* 34 (2004):1–8.

Table 1.2 provides specific activity categories based on the number of daily steps taken. A 10-minute brisk walk (a distance of about 1,200 yards at a 15-minutes-per-mile pace) is approximately 1,300 steps. A 15-minute mile (1,770 yards) walk is about 1,900 steps.[32]

In terms of steps per day, a person is said to be sedentary if he/she takes fewer than 5,000 steps per day. This notion was substantiated by 2021 research indicating that, after walking fewer than 5,000 steps in a day, the human body is less able to metabolize fat the following day.[33] If you do not accumulate the recommended 10,000 daily steps, you can refer to Table 1.3 to determine the additional walking or jogging distance required to reach your goal.

Hoeger Key To Wellness

The general recommendation for adults is to take 10,000 steps per day. A 10-minute brisk walk is approximately 1,100 steps.

Example. If you are 5 feet 8 inches tall and female, and you typically accumulate 5,200 steps per day, you would need an additional 4,800 daily steps to reach your 10,000-step goal. You can do so by jogging 3 miles at a 10-minutes-per-mile pace (1,602 steps × 3 miles = 4,806 steps) on some days, and you can walk 2.5 miles at a 15-minutes-per-mile pace (1,941 steps × 2.5 = miles = 4,853 steps) on other days. If you do not find a particular speed (pace) that you typically walk or jog at in Table 1.3, you can estimate the number of steps at that speed using the prediction equations at the bottom of this table.

Activity tracker An electronic device that contains an accelerometer (a unit that measures gravity, detects changes in movement, and counts footsteps). These devices can also determine distance, calories burned, speeds, and time spent being physically active.

The first practical application that you can undertake in this course is to determine your current level of daily activity. The log provided in Lab 1A will help you do this. Keep a 1- to 7-day log of all physical activities that you do daily. On this log, record the time of day, type and duration of the exercise/activity, and, if possible, steps taken while engaged in the activity. The results will indicate how active you are and serve as a basis to monitor changes in the next few months and years.

1.12 Economic Benefits of Physical Activity

Sedentary living can have a strong effect on a nation's economy. As the need for physical exertion in Western countries decreased steadily during the past century, health care expenditures increased dramatically. Health care costs in the U.S. rose from $12 billion in 1950 to $3.8 trillion in 2019 (Figure 1.13), or about 17.1 percent

Table 1.3 Estimated Number of Steps to Walk, Jog, or Run a Mile Based on Pace, Height, and Gender

	Pace (min/mile) Walking								Jogging/Running			
	20		18		16		15		12	10	8	6
Height	Women	Men	Women	Men	Women	Men	Women	Men	(both men and women)			
5′0″	2,371	2,338	2,244	2,211	2,117	2,084	2,054	2,021	1,997	1,710	1,423	1,136
5′2″	2,343	2,310	2,216	2,183	2,089	2,056	2,026	1,993	1,970	1,683	1,396	1,109
5′4″	2,315	2,282	2,188	2,155	2,061	2,028	1,998	1,965	1,943	1,656	1,369	1,082
5′6″	2,286	2,253	2,160	2,127	2,033	2,000	1,969	1,937	1,916	1,629	1,342	1,055
5′8″	2,258	2,225	2,131	2,098	2,005	1,872	1,941	1,908	1,889	1,602	1,315	1,028
5′10″	2,230	2,197	2,103	2,070	1,976	1,943	1,913	1,880	1,862	1,575	1,288	1,001
6′0″	2,202	2,169	2,075	2,042	1,948	1,915	1,885	1,852	1,835	1,548	1,261	974
6′2″	2,174	2,141	2,047	2,014	1,920	1,887	1,857	1,824	1,808	1,521	1,234	947

Prediction equations (pace in min/mile and height in inches):

Walking

Women: Steps/mile = 1,949 + [(63.4 × pace) − (14.1 × height)]

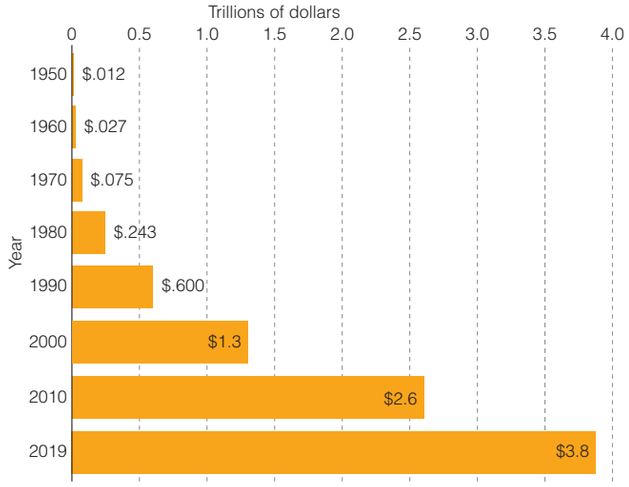
Men: Steps/mile = 1,916 + [(63.4 × pace) − (14.1 × height)]

Jogging

Women and Men: Steps/mile = 1,084 + [(63.4 × pace) − (14.1 × height)]

Adapted from Werner W. K. Hoeger et al., "One-Mile Step Count at Walking and Running Speeds," *ACSM's Health & Fitness Journal* 12, no. 1 (2008):14–19.

Figure 1.13 U.S. health care cost increments since 1950.

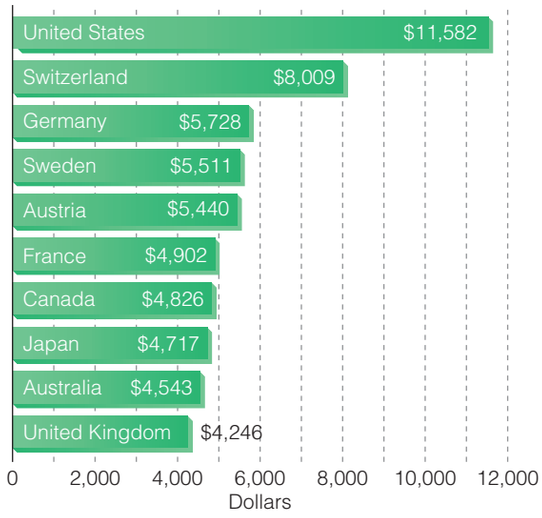


of the country's gross domestic product (GDP). In 1980, health care costs in the U.S. represented 8.8 percent of the GDP.[34] This ratio far outpaces the spending of all other countries in the OECD. According to the Institute of Medicine, up to a third of health care costs are wasteful or inefficient.[35]

In terms of yearly health care costs per person, the U.S. ranks in the top three OECD countries. Per capita U.S. health care costs exceed $10,000 per year. These costs more than double the OECD average (Figure 1.14). Furthermore, in terms of health care value, the consumer does not have the needed information to make rational decisions. Costs (prices) and care quality data are not readily available as in other markets (automobile, housing, and groceries).

An estimated 5 percent of the people account for 50 percent of health care costs.[36] This group spends an annual average of around $50,000 in health care. The top 1% average about $110,000. On the other end, the 50% of the people who spend the least account for only 3% of all total health spending, about $276 per year. Half of the people use 84 percent of health care dollars. Without reducing the current burden of disease, real health care reform will not be possible. True health care reform requires a nationwide call for action by everyone against chronic disease.

Figure 1.14 Health care expenditure per capita for selected countries, 2015.



1.13 Wellness

Most people recognize that participating in fitness programs improves their quality of life. At the end of the 20th century, however, we came to realize that physical fitness alone was not always sufficient to lower the risk for disease and ensure better health.

As the years go on, research continues to illuminate how tightly interwoven our lifestyle choices are, down to the level of celluar function. Good health should not be viewed simply as the absence of illness. Even though most people are aware of their unhealthy behaviors, they seem satisfied with life as long as they are free from symptoms of disease or illness. Nevertheless, present lifestyle habits dictate the health and well-being of tomorrow. Activity in early- and mid-adulthood affects disease risk for the remainder of the lifespan—particularly for diseases like cardiovascular disease, cancer, diabetes, and Alzheimer's.

Once the idea took hold that fitness by itself would not always decrease the risk for disease and ensure better health, the **wellness** concept followed. Wellness implies a constant and deliberate effort to stay healthy and achieve the highest potential for well-being. For example, people at risk for high blood pressure may choose a work environment that minimizes sitting, practice stress management techniques, watch their body weight, exercise regularly, combat anxiety and loneliness, and limit sodium and alcohol consumption to prevent hypertension along with other chronic diseases related to high blood pressure. Living a wellness way of life is a personal choice, but you may need additional support to achieve wellness goals.

The Seven Dimensions of Wellness

Wellness has seven dimensions: physical, emotional, mental, social, environmental, occupational, and spiritual (Figure 1.15). These dimensions are interrelated: One frequently affects the others. For example, a person who is emotionally "down" often has no desire to exercise, study, socialize with friends, or attend church, and he or she will be more susceptible to illness and disease.

Wellness incorporates factors such as adequate fitness, proper nutrition, stress management, disease prevention, spirituality, not smoking or abusing drugs, personal safety, regular physical examinations, health education, and environmental support. In order to live a wellness way of life, individuals must view themselves as someone whose well-being is their ultimate responsibility. Though the statement may sound obvious, the reverse is often true. Too often people are more likely to care for family members or even pets with greater responsibility than they care for themselves. A wellness way of life requires that each of us make deliberate efforts to care for ourselves.

Figure 1.15 Dimensions of wellness.

Kay Liedl/Unsplash

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

For a wellness way of life, individuals must be physically fit and manifest no signs of disease, and they also must be free of risk factors for disease (such as hypertension, hyperlipidemia, cigarette smoking, negative stress, faulty nutrition, careless sex). The relationship between adequate fitness and wellness is illustrated in the continuum in Figure 1.16.

Physical Wellness

Physical wellness is the dimension most commonly associated with being healthy. It entails confidence and optimism about one's ability to protect physical health and take care of health problems.

Physically well individuals are physically active, exercise regularly, avoid uninterrupted bouts of sitting, eat a well-balanced diet, maintain recommended body weight, get sufficient sleep, practice safe sex, minimize exposure to environmental contaminants, avoid harmful drugs (including tobacco and excessive alcohol), and seek medical care and exams as needed. Physically well people also exhibit good cardiorespiratory endurance, adequate muscular strength and flexibility, proper body composition, and the ability to carry out ordinary and unusual demands of daily life safely and effectively. Interviews with people who live past 100 years of age indicate that they prioritize staying active on a daily basis. Their daily routine includes gardening, yardwork, swimming, and lots of walking.

Emotional Wellness

Emotional wellness involves the ability to understand your own feelings, accept your limitations, and achieve emotional stability. Furthermore, it implies the ability to express emotions appropriately, adjust to change, cope with stress in a healthy way, and enjoy life despite its occasional disappointments and frustrations.

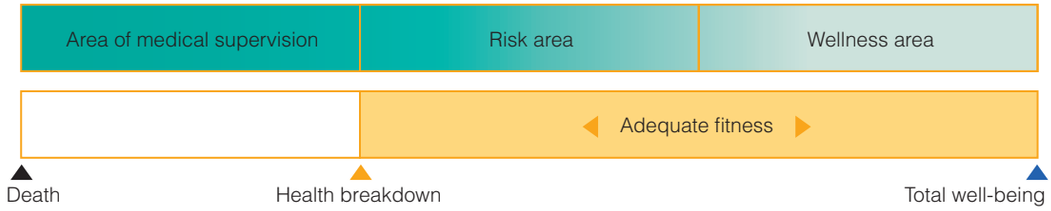
Emotional wellness brings with it a certain stability, an ability to look both success and failure squarely in the face and keep moving along a predetermined course. When success is evident, the emotionally well person radiates the expected joy and confidence. When failure seems evident, the emotionally well person responds by making the best of circumstances and moving beyond the failure. Wellness enables you to move ahead with optimism and energy instead of spending time

Wellness The constant and deliberate effort to stay healthy and achieve the highest potential for well-being. It encompasses seven dimensions—physical, emotional, mental, social, environmental, occupational, and spiritual—and integrates them all into a quality life.

Physical wellness Good physical fitness and confidence in your personal ability to take care of health problems.

Emotional wellness The ability to understand your own feelings, accept your limitations, and achieve emotional stability.

Figure 1.16 Wellness continuum.



Get it Done: Behavior Modification Planning

Financial Fitness Prescription

S_Razvodovskij/Deposit Photos

Although not one of the components of physical fitness, taking control of your personal finances is critical for your success and well-being. The sooner you start working on a lifetime personal financial plan, the more successful you will be in becoming financially secure and able to retire early, in comfort, if you choose to do so. Most likely, you have not been taught basic principles to improve personal finance and enjoy "financial fitness." Thus, start today using the following strategies:

I Plan To	I Did It	
☐	☐	*Develop a personal financial plan.* Set short-term and long-term financial goals for yourself. If you do not have financial goals, you cannot develop a plan or work toward that end.
☐	☐	*Subscribe to a personal finance magazine or newsletter.* In the same way that you should regularly read reputable fitness/wellness journals or newsletters, you should regularly peruse a "financial fitness" magazine. If you don't enjoy reading financial materials, then find a periodical that is quick and to the point; there are many available. You don't have to force yourself to read *The Wall Street Journal* to become financially knowledgeable. Many periodicals have resources to help you develop a financial plan. Educate yourself and stay current on personal finances and investment matters.
☐	☐	*Set up a realistic budget and live on less than you make.* Pay your bills on time and keep track of *all* expenses. Then develop your budget so that you spend less than you earn. Your budget may require that you either cut back on expenses and services or figure out a way to increase your income. Balance your checkbook regularly and do not overdraft your checking account. Remind yourself that satisfaction comes from being in control of the money you earn.
☐	☐	*Learn to differentiate between wants and needs.* It is fine to reward yourself for goals that you have achieved (see Chapter 2), but limit your spending to items that you truly need. Avoid simple impulse spending because "it's a bargain" or something you just want to have.
☐	☐	*Pay yourself first; save 10 percent of your income each month.* Before you take any money out of your paycheck, put 10 percent of your income into a retirement or investment account. If possible, ask for an automatic withdrawal at your bank from your paycheck to avoid the temptation to spend this money. This strategy may allow you to have a solid retirement fund or even provide for an early retirement. If you start putting away $100 a month at age 20, and earn a 6 percent interest rate, at age 65 you will have more than $275,000. Think what this amount could be if you are able to put away $200 to $500 a month.
☐	☐	*Set up an emergency savings fund.* Whether you ultimately work for yourself or for someone else, there may be uncontrollable financial setbacks or even financial disasters in the future. So, as you are able, start an emergency fund equal to 3 to 6 months of normal monthly earnings. Additionally, start a second savings account for expensive purchases such as a car, a down payment on a home, or a vacation.
☐	☐	*Use credit, gas, and retail cards responsibly and sparingly.* As soon as you receive new cards, sign them promptly and store them securely. Due to the prevalence of identity theft (someone stealing your creditworthiness), cardholders should even consider a secure post office box, rather than a regular mailbox, for all high-risk mail. You may also consider signing up for online statements instead of having them mailed to you. Also, shred your old credit cards, monthly statements, and any and all documents that contain personal information to avoid identity theft. Pay off all credit card debt monthly, and do not purchase on credit unless you have the cash to pay it off when the monthly statement arrives. Develop a plan at this very moment to pay off your debt if you have such. Credit card balances, high interest rates, and frequent credit purchases lead to financial disaster. Credit card debt is the worst enemy to your personal finances!

Behavior Modification Planning (continued)

I Plan To	I Did It	
☐	☐	*Understand the terms of your student loans.* Do not borrow more money than you absolutely need for actual educational expenses. Student loans are not for wants but needs (see fourth item above). Remember, loans must be repaid, with interest, once you leave college. Be informed regarding the repayment process and do not ever default on your loan. If you do, the entire balance (principal, interest, and collection fees) is due immediately and serious financial and credit consequences will follow.
☐	☐	*Complete your college education.* The gap is widening between workers who have and have not graduated from college. On average, those whose education ends with their high school diploma bring home a paycheck that is 62 percent of the paycheck of their peers with a bachelor's degree. Even with rising tuition costs, this investment of time and money is a financially sound choice. Of the two-thirds of students who take on student loans to complete their degree, 86 percent agree the degree pays off.
☐	☐	*Eat out infrequently.* Besides saving money that you can then pay to yourself, you will eat healthier and consume fewer calories.
☐	☐	*Make the best of tax "motivated" savings and investing opportunities available to you.* For example, once employed, your company may match your voluntary 401(k) contributions (or other retirement plan), so contribute at least up to the match (you may use the 10 percent you "pay yourself first"—see fifth item—or part of it). Also, under current tax law, maximize your Roth IRA contribution personally. Always pay attention to current tax rules that provide tax incentives for investing in retirement plans. If at all possible, *never* cash out a retirement account early. You may pay penalties in addition to tax, in most situations. As you are able, employ a tax professional or financial planner to avoid serious missteps in your tax planning.
☐	☐	*Stay involved in your financial accumulations.* Even if you seek professional advice, stay in control. Ultimately, no one will look after your interests as well as you. Avoid placing all your trust (and assets) in one individual or institution. Spreading out your assets is one way to diversify your risk.
☐	☐	*Protect your assets.* As you start to accumulate assets, get proper insurance coverage (yes, even renter's insurance) in case of an accident or disaster. You have disciplined yourself and worked hard to obtain those assets; now make sure they are protected.
☐	☐	*Review your credit report.* The best way to ensure that your credit "identity" is not stolen and ruined is to regularly review your credit report, at least once a year, for accuracy.
☐	☐	*Contribute to charity and the needy.* Altruism (doing good for others) is good for heart health and emotional well-being. Remember the less fortunate: donate regularly to some of your favorite charitable organizations and volunteer time to worthy causes.

The Power of Investing Early

Jon and Jasmine are both 20 years old. Jon begins investing $100 a month starting on his 20th birthday. He stops investing on his 30th birthday (he has set aside a total of $12,000). Jasmine does not start investing until she's 30. She chooses to invest $100 a month as Jon had done, but she does so for the next 30 years (Jasmine invests a total of $36,000). Although Jon stopped investing at age 30, assuming an 8 percent annual rate of return in a tax-deferred account, by the time both Jon and Jasmine are 60, Jon will have accumulated $199,035, whereas Jasmine will have $150,029. At a 6 percent rate of return, they would both accumulate about $100,000, but Jasmine invested three times as much as Jon did.

Post these principles of financial fitness in a visible place at home where you can review them often. Start implementing these strategies as soon as you can and watch your financial fitness level increase over the years.

and talent worrying about failure. You learn from it, identify ways to avoid it in the future, and then go on with the business at hand.

Emotional wellness also involves happiness—an emotional anchor that gives meaning and joy to life. Happiness is a long-term state of mind that permeates the various facets of life and influences our outlook. Although there is no simple recipe for creating happiness, researchers agree that happy people are usually participants in some category of a supportive family unit where they feel loved. Healthy, happy people enjoy friends, work hard at something fulfilling, get plenty of exercise, and enjoy play and leisure time. They know how to laugh, and they laugh often. They give of themselves freely to others and seem to have found deep meaning in life.

An attitude of true happiness signals freedom from the tension and depression that many people endure. Emotionally well people are obviously subject to the same kinds of depression and unhappiness that occasionally plague us all, but the difference lies in the ability to bounce back. Well people take minor setbacks in stride and have the ability to enjoy life despite it all. They don't waste energy or time recounting the situation, wondering how they could have changed it, or dwelling on the past.

Mental Wellness

Mental wellness, also referred to as intellectual wellness, implies that you can apply the things you have learned, create opportunities to learn more, and engage your mind in lively interaction with the world around you. When you are mentally well, you are not intimidated by facts and figures with which you are unfamiliar, but you embrace the chance to learn something new. You enjoy the safety and routine of familiar environments while, also, confidently approaching new and less predictable experiences. Your confidence and enthusiasm enable you to approach any learning situation with eagerness that leads to success. Staying mentally engaged through a lifetime reading program has also been shown to extend life.

Mental wellness brings with it vision and promise. It brings with it the ability to expand the places and situations in your life where you are confident. More than anything else, mentally well people are open-minded and accepting of others. Instead of being threatened by people who are different from themselves, they show respect and curiosity without feeling they have to conform. They are faithful to their own ideas and philosophies and allow others the same privilege. Their self-confidence guarantees that they can take their place among others in the world without having to give up part of themselves and without requiring others to do the same.

Social Wellness

Social wellness, with its accompanying positive self-image, endows you with the ease and confidence to be outgoing, friendly, and affectionate toward others. Social wellness involves a concern for oneself and also an interest in humanity and the environment as a whole.

Research has consistently shown that people who have healthy, loving relationships and a strong social network live healthier and longer lives. One of the hallmarks of social wellness is the ability to relate to others and to reach out to other people, both within one's family and outside it. Similar to emotional wellness, it involves being comfortable with your emotions and thus helps you understand and accept the emotions of others. Your own balance and sense of self allow you to extend respect and tolerance to others. Healthy people are honest and loyal. They understand that part of honesty requires them to advocate for themselves in some situations while being flexible, giving, and accommodating to people around them in other situations. This dimension of wellness leads to the ability to maintain close relationships with other people.

Research has shown the importance of social wellness. Loneliness increases levels of the stress hormone cortisol, increases vascular resistance, impairs immune function, and accelerates cognitive decline. Young people also need to guard against chronic loneliness. Individuals who were constantly isolated as youth have been shown to have poorer health two decades later.[37] Human connection is critical, and taking advantage of the organizations, classes, and group activities in your community will bring long-term payoffs.

Environmental Wellness

Environmental wellness refers to the effect that our surroundings have on our well-being. Our planet is a delicate **ecosystem**, and its health depends on the continuous recycling of its elements. Environmental wellness implies a lifestyle that maximizes harmony with the earth and takes action to protect the world around us.

Environmental threats include air pollution, chemicals, ultraviolet radiation in the sunlight, water and food contamination, secondhand smoke, noise, inadequate shelter, unsatisfactory work conditions, lack of personal safety, and unhealthy relationships. Health is affected negatively when we live in a polluted, toxic, unkind, and unsafe environment.

To enjoy environmental wellness, we are responsible for educating and protecting ourselves against environmental hazards and also protecting the environment so that we, our children, and future generations can enjoy a safe and clean environment.

Steps that you can take to live an environmentally conscious life include conserving energy; recycling; conserving paper and water; not polluting the air, water, or Earth if you can avoid doing so; not smoking; planting trees and keeping plants and shrubs alive; evaluating purchases and conveniences based on their environmental impact; donating old clothes; and spending leisure time enjoying and appreciating the outdoors. Time spent in natural settings has been clinically shown to improve one's long-term sense of peacefulness, fulfillment, spirituality, and appreciation for nature's wonders.

Occupational Wellness

Occupational wellness is not tied to a high salary, a prestigious position, or extravagant working conditions. Any job can bring occupational wellness if it provides rewards that are important to the individual. To one person, salary might be the most important factor, whereas another might place much greater value on creativity. Those who are occupationally well have their own "ideal" job, which allows them to thrive.

One school of thought, developed by psychologist Fredrick Herzberg, suggests that the factors of a job that cause dissatisfaction lie on a completely separate continuum from factors that provide satisfaction. Dissatisfaction can be reduced with what Herzberg calls hygiene factors, including a good relationship with supervisors, fair compensation, and reasonable company policies, whereas satisfaction can be improved with motivating factors such as recognition for accomplishments or work the employee finds purposeful and satisfying. A situation in which employees enjoy both positive hygiene factors and positive motivating factors results in occupational wellness.

People with occupational wellness face demands on the job, but they also have some say over demands placed on them. Any job has routine demands, but in occupational wellness, routine demands are mixed with new, unpredictable challenges that keep a job exciting. Occupationally well people are able to maximize their skills, and they have the opportunity to broaden their existing skills or gain new ones. Their occupation offers the opportunity for advancement and recognition for achievement. Occupational wellness encourages collaboration and interaction among coworkers, which fosters a sense of teamwork and support.

Spiritual Wellness

Spiritual wellness provides a unifying power that integrates all dimensions of wellness. Basic characteristics of spiritual people include a sense of meaning and direction in life and a relationship

to a higher being. Pursuing these avenues may lead to personal freedom, including prayer, faith, love, closeness to others, peace, joy, fulfillment, and altruism.

Several studies have reported positive relationships among spiritual well-being, emotional well-being, and satisfaction with life. Spiritual health is intertwined with physical health. People who attend church and regularly participate in religious organizations enjoy better health, have a lower incidence of chronic diseases, are more socially integrated, handle stress more effectively, and appear to live longer.[38] Other studies have shown that spirituality strengthens the immune system, is good for mental health, prevents age-related memory loss, decreases the incidence of depression, leads to fewer episodes of chronic inflammation, and decreases the risk of death and suicide.

For example, can you recall feeling awe and amazement during a time of spirituality or while taking in a spectacular scene in nature or a beautiful piece of artwork or music? That sense of wonder has been shown to lower inflammation-inducing compounds and increase life expectancy.[39] Awe tends to make us feel closer to our fellow humans and to bring a sense of perspective. The same epic feeling, however, can come from everyday experiences, like witnessing the kindness of a stranger or examining the intricate pattern of a leaf.

Prayer is a signpost of spirituality at the core of most spiritual experiences. It is communication with a higher power. At least 200 studies have been conducted on the effects of prayer on health. About two-thirds of these studies have linked prayer to positive health outcomes—as long as these prayers are offered with sincerity, humility, love, empathy, and compassion.[40]

Altruism, a key attribute of spiritual people, seems to enhance health and longevity. Studies indicate that people who regularly volunteer live longer. Research has found that health benefits of altruism are so powerful that doing good for others is good for oneself, especially for the immune system.

Researchers believe that there seems to be a strong connection among the mind, spirit, and body. As one improves, the others follow. The relationship between spirituality and wellness is meaningful in our quest for a better quality of life. As with the other dimensions, development of the spiritual dimension to its fullest potential contributes to wellness. Wellness requires a balance among all seven dimensions.

Monica Melton/Unsplash

Altruism enhances health and well-being.

Critical Thinking

Now that you understand the seven dimensions of wellness, rank them in order of importance to you and explain your rationale in doing so.

1.14 Meeting the Challenge for Our Day

Because a better and healthier life is something that every person should strive for, our biggest health challenge today is to teach people how to take control of their personal health habits and adhere to a positive lifestyle. A wealth of information on the benefits of fitness and wellness programs indicates that improving the quality and possible length of our lives is a matter of personal choice.

Even though people in the U.S. believe a positive lifestyle has a great impact on health and longevity, most people do not reap the benefits because they simply do not know how to implement a safe and effective fitness and wellness program. Others are exercising incorrectly and, therefore, are not reaping the full benefits of their program. How, then, can we meet the health challenges of the 21st century? That is the focus of this book—to provide the necessary tools that will enable you to write, implement, and regularly update your personal lifetime fitness and wellness program.

Critical Thinking

What are your thoughts about lifestyle habits that enhance health and longevity? How important are they to you? What obstacles keep you from adhering to these habits or incorporating new habits into your life?

Mental wellness A state in which your mind is engaged in lively interaction with the world around you.

Social wellness The ability to relate well to others, both within and outside the family unit.

Environmental wellness The capability to live in a clean and safe environment that is not detrimental to health.

Ecosystem A community of organisms interacting with each other in an environment.

Occupational wellness The ability to perform your job skillfully and effectively under conditions that provide personal and team satisfaction and adequately reward each individual.

Spiritual wellness The sense that life is meaningful and has purpose and that some power brings all humanity together; the ethics, values, and morals that guide you and give meaning and direction to life.

Prayer Sincere and humble communication with a higher power.

Altruism Unselfish concern for the welfare of others.

1.15 Wellness Education: Using This Book

Although everyone would like to enjoy good health and wellness, most people don't know how to reach this objective. Lifestyle is the most important factor affecting personal well-being. Granted, some people live long because of genetic factors, but quality of life during middle age and the "golden years" is more often related to wise choices initiated during youth and continued throughout life. In a few short years, lack of wellness can lead to a loss of vitality and gusto for life, as well as premature morbidity and mortality.

A Personalized Approach

Because fitness and wellness needs vary significantly from one individual to another, all exercise and wellness prescriptions must be personalized to obtain the best results. The Wellness Lifestyle Questionnaire in Lab 1B will provide an initial rating of your current efforts to stay healthy and well. Subsequent chapters of this book and their respective activities discuss the components of a wellness lifestyle and set forth the necessary guidelines that will allow you to develop a personal lifetime program to improve fitness and promote your own preventive health care and personal wellness.

As you study this book you will learn to:

- Implement motivational and behavior modification techniques to help you adhere to a lifetime fitness and wellness program.
- Determine whether medical clearance is needed for your safe participation in exercise.
- Conduct nutritional analyses and follow the recommendations for adequate nutrition.
- Write sound diet and weight-control programs.
- Assess the health-related components of fitness.
- Write exercise prescriptions for cardiorespiratory endurance, muscular fitness, and muscular flexibility.
- Understand the relationship between fitness and aging.
- Determine your levels of tension and stress, reduce your vulnerability to stress, and implement a stress management program if necessary.
- Determine your potential risk for cardiovascular disease and implement a risk-reduction program.
- Follow a cancer risk-reduction program.
- Implement a smoking cessation program, if applicable.
- Avoid chemical dependency and know where to find assistance if needed.
- Recognize the health consequences of sexually transmitted infections (STIs).
- Write goals and objectives to improve your fitness and wellness and learn how to chart a wellness program for the future.
- Differentiate myths from facts about exercise and health-related concepts.

Exercise Safety

Even though testing and participation in exercise are relatively safe for most apparently healthy individuals, the reaction of the cardiovascular system to higher levels of physical activity cannot be totally predicted. Consequently, a small but real risk exists for exercise-induced abnormalities in people with a history of cardiovascular problems, those with certain chronic conditions, and those who are at higher risk for disease. Among the exercise-induced abnormalities are abnormal blood pressure; irregular heart rhythm; fainting; and, in rare instances, a heart attack or cardiac arrest.

Before you engage in an exercise program or participate in any exercise testing, at a minimum you should review the Health History Questionnaire found in Lab 1C. Exercise testing and participation are not wise under some of the conditions listed in this activity and may require a medical evaluation. An additional comprehensive questionnaire, the Physical Activity Readiness Questionnaire (PAR-Q), can be accessed on MindTap at www.cengage.com. If you have any questions regarding your current health status, consult your doctor before initiating, continuing, or increasing your level of physical activity.

1.16 Assessment of Resting Heart Rate and Blood Pressure

Heart rate can be obtained by counting your pulse either on the wrist over the radial artery or over the carotid artery in the neck (Chapter 6, pages 215–216). In Lab 1D, you will have an opportunity to determine your heart rate and blood pressure and calculate the extra heart rate life years an increase in exercise may produce.

Heart Rate

To determine your heart rate, either count your pulse for 30 seconds and multiply by 2 or take it for a full minute. The heart rate usually is at its lowest point (resting heart rate) late in the evening after you have been sitting quietly for about half an hour watching a relaxing TV show or reading in bed or early in the morning just before you get out of bed. Your pulse should have a consistent (regular) rhythm. A pulse that misses beats or speeds up or slows down may be an indication of heart problems and should be followed up by a physician.

Unless you have a **pathological** condition, a lower resting heart rate indicates a stronger heart. To adapt to cardiorespiratory or aerobic exercise, blood volume increases, the heart enlarges, and the muscle gets stronger. A stronger heart can pump more blood with fewer strokes.

Resting heart rate categories are given in Table 1.4. Although resting heart rate decreases with training, the extent of **bradycardia** depends not only on the amount of training, but also on genetic factors. Although most highly trained athletes have a resting heart rate around 40 beats per minute, occasionally one of these athletes has a resting heart rate in the 60s or

Table 1.4 Resting Heart Rate Ratings

Heart Rate (bpm)	Rating
≤59	Excellent
60–69	Good
70–79	Average
80–89	Fair
≥9	Poor

70s, even during peak training months of the season. For most individuals, however, the resting heart rate decreases as the level of cardiorespiratory endurance increases.

Hush Naidoo Jade Photography/Unsplash

Assessment of resting blood pressure with an automated blood pressure device.

Blood Pressure

Blood pressure is assessed using a **sphygmomanometer** and a stethoscope. In 2019, the AHA released updated guidelines for the proper measurement of blood pressure.[41] Ideally, the person should sit quietly for 3 to 5 minutes prior to taking the measurement and should not talk during this time. Exercise, smoking, and caffeine are to be avoided 30 minutes prior to testing. During the assessment, the individual sits calmly in a chair with the back supported, uncrossed legs, feet flat on the floor, the arm slightly flexed, and the forearm resting on a flat surface at the same level as the heart. Sleeves should not be rolled up because this creates a tourniquet effect that will yield a higher reading. At first, the pressure is recorded from each arm and after that from the arm with the highest reading.

Use a cuff of the appropriate size to get accurate readings. Size is determined by the width of the inflatable bladder, which should be about 80 percent of the circumference of the midpoint of the arm. The cuff should be applied on bare skin, approximately an inch above the antecubital space (natural crease of the elbow), with the center of the bladder directly over the medial (inner) surface of the arm. The stethoscope head should be applied firmly, but with little pressure, over the brachial artery in the antecubital space.

To determine how high the cuff should be inflated, the person recording the blood pressure monitors the subject's radial pulse with one hand and, with the other hand, inflates the manometer's bladder to about 30 to 40 mm Hg above the point at which the feeling of the pulse in the wrist disappears. Next, the pressure is released, followed by a wait of about 1 minute, then the bladder is inflated to the predetermined level to take the blood pressure reading. The cuff should not be overinflated because this may cause blood vessel spasm, resulting in higher blood pressure readings. The pressure should be released at a rate of 2 to 4 mm Hg per second. As the pressure is released, **systolic blood pressure (SBP)** is recorded as the point where the sound of the pulse becomes audible. The **diastolic blood pressure (DBP)** is the point where the sound disappears. The recordings should be expressed as systolic over diastolic pressure—for example, 124/80.

Whenever possible, blood pressure should be measured in both arms. Readings for both arms will be similar in most people. A large difference in systolic blood pressure between arms, 10 points or more, signals an increased risk for cardiovascular disease. In this case, the individual should follow up with a physician to further discuss disease risk and, if necessary, create a prevention plan.

When you take more than one reading, be sure the bladder is completely deflated between readings and allow at least a full minute before making the next recording. The person measuring the pressure also should note whether the pressure was recorded from the left or the right arm. Resting blood pressure ratings are given in Table 1.5.

In some cases, the pulse sounds become less intense (point of muffling sounds) but still can be heard at a lower pressure (50 or 40 mm Hg) or even all the way down to zero. In this situation, the diastolic pressure is recorded at the point of a clear, definite change in the loudness of the sound (also referred to as fourth phase) and at complete disappearance of the sound (fifth phase) (e.g., 120/78/60 or 120/82/0).

The 2019 guidelines also encourage unattended automated office blood pressure (AOBP) assessment. This procedure requires the individual to sit quietly and alone in a room while hooked up to an automated electronic monitor that measures blood pressure a minimum of three times and produces an

Pathological Relating to the causes and effects of disease or injury.

Bradycardia Slower heart rate than normal.

Sphygmomanometer Inflatable bladder contained within a cuff and a mercury gravity manometer (or aneroid manometer) from which blood pressure is read.

Systolic blood pressure (SBP) Pressure exerted by blood against walls of arteries during forceful contraction (systole) of the heart.

Diastolic blood pressure (DBP) Pressure exerted by the blood against the walls of the arteries during the relaxation phase (diastole) of the heart.

Get it Done: Behavior Modification Planning

Healthy Lifestyle Habits

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

I Plan To | I Did It

- ☐ ☐ *Participate in a lifetime physical activity program and avoid being sedentary for extended periods.* Attempt to accumulate 60 minutes of moderate-intensity physical activity most days of the week. The 60 minutes should include 20 to 30 minutes of aerobic exercise (vigorous-intensity) at least three times per week, along with other routine activities of daily living, and strengthening and stretching exercises two to three times per week. Furthermore, keep moving throughout the day. Do not sit for more than an hour at a time without getting up to move or stretch for 5 to 10 minutes.
- ☐ ☐ *Do not smoke cigarettes.* Cigarette smoking is the largest preventable cause of illness and premature death in the U.S. If we include all related deaths, smoking is responsible for about 480,000 unnecessary deaths each year.
- ☐ ☐ *Eat right.* Eat a good breakfast and two additional well-balanced meals every day. Avoid eating too many calories; processed foods; and foods with a lot of sugar, saturated fat, and salt. Increase your daily consumption of fruits, vegetables, and whole-grain products.
- ☐ ☐ *Avoid snacking.* Refrain from frequent high-sugar snacks between meals. Insulin is released to remove sugar from the blood, and frequent spikes in insulin may contribute to the development of diabetes and heart disease.
- ☐ ☐ *Maintain recommended body weight through adequate nutrition and exercise.* This is important in preventing chronic diseases and in developing a higher level of fitness.

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- ☐ ☐ *Sleep 7 to 8 hours every night.*
- ☐ ☐ *Lower your stress levels.* Reduce your vulnerability to stress and practice stress management techniques as needed.
- ☐ ☐ *Be wary of alcohol.* Drink alcohol moderately or not at all. Alcohol abuse leads to mental, emotional, physical, and social problems.
- ☐ ☐ *Surround yourself with healthy friendships.* Unhealthy friendships contribute to destructive behaviors and low self-esteem. Associating with people who strive to maintain good fitness and health reinforces a positive outlook in life and encourages positive behaviors. Mortality rates are much higher among people who are socially isolated.
- ☐ ☐ *Be informed about the environment.* Seek clean air, clean water, and a clean environment. Be aware of pollutants and occupational hazards: asbestos fibers, nickel dust, chromate, uranium dust, and so on. Take precautions when using pesticides and insecticides.
- ☐ ☐ *Increase education.* Data indicate that people who are more educated live longer. As education increases, so do the number of connections between nerve cells. An increased number of connections help the individual make better survival (i.e., healthy lifestyle) choices.
- ☐ ☐ *Take personal safety measures.* Although not all accidents are preventable, many are. Taking simple precautionary measures—such as using seat belts and keeping electrical appliances away from water—lessens the risk for avoidable accidents.

Try It

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

Table 1.5 Blood Pressure Guidelines (in mm Hg)

Rating	Systolic		Diastolic
Normal	<120	and	<80
Elevated	120–129	and	<80
Stage 1 hypertension	130–139	or	80–89
Stage 2 hypertension	>140	or	>90
Hypertensive crisis	>180	and/or	>120

SOURCE: *American College of Cardiology/American Heart Association.*

average of the three recordings. The absence of medical personnel in the room prevents talking and minimizes the "white-coat hypertension" effect caused by the presence of medical staff in the room.

When measuring blood pressure, be aware that a single reading may not be an accurate value because of the various factors (rest, stress, physical activity, food) that can affect blood pressure. Thus, if you are able, ask different people to take several readings at different times of the day to establish the real values. You can record the results of your resting heart rate and your SBP and DBP assessments in Lab 1D. You can also calculate the effects of aerobic activity on resting heart rate in this lab.

Assess Your Behavior

1. Are you aware of your family health history and lifestyle factors that may negatively affect your health?
2. Do you accumulate at least 30 minutes of moderate-intensity physical activity 5 days per week and avoid excessive periods of daily sitting?
3. Do you make a constant and deliberate effort to stay healthy and achieve the highest potential for well-being?

Assess Your Knowledge

1. Advances in modern technology
   a. help people achieve higher fitness levels.
   b. have led to a decrease in chronic diseases.
   c. decreased physical exertion in daily life.
   d. help fight hypokinetic disease.
   e. make it easier to achieve good aerobic fitness.
2. The category of movement called nonexercise activity thermogenesis (NEAT) includes
   a. extremely light expenditures of energy like performing self-care.
   b. light physical activity like walking to work.
   c. moderate physical activity like raking leaves.
   d. energy expenditure that does not come from basic ongoing body functions.
   e. All are correct choices.
3. The leading cause of death in the United States is
   a. cancer.
   b. accidents.
   c. CLRD.
   d. diseases of the cardiovascular system.
   e. drug abuse.
4. Bodily movement produced by skeletal muscles is called
   a. physical activity.
   b. kinesiology.
   c. exercise.
   d. aerobic exercise.
   e. muscle strength.
5. Among the long-term benefits of regular physical activity and exercise is a significantly reduced risk for developing or dying from
   a. heart disease.
   b. type 2 diabetes.
   c. colon and breast cancers.
   d. osteoporotic fractures.
   e. All are correct choices.
6. To be ranked in the "active" category, an adult has to take between
   a. 3,500 and 4,999 steps per day.
   b. 5,000 and 7,499 steps per day.
   c. 7,500 and 9,999 steps per day.
   d. 10,000 and 12,499 steps per day.
   e. 12,500 and 15,000 steps per day.
7. The constant and deliberate effort to stay healthy and achieve the highest potential for well-being is defined as
   a. health.
   b. physical fitness.
   c. wellness.
   d. health-related fitness.
   e. physiological fitness.
8. Research on the effects of fitness on mortality indicates that the largest drop in premature mortality is seen between
   a. the average and excellent fitness groups.
   b. the low and moderate fitness groups.
   c. the high and excellent fitness groups.
   d. the moderate and good fitness groups.
   e. The drop is similar among all fitness groups.
9. Metabolic fitness can be achieved through
   a. a moderate-intensity exercise program.
   b. a high-intensity interval-training program.
   c. an increased basal metabolic rate.
   d. anaerobic training.
   e. an increase in lean body mass.
10. What is the greatest benefit of being physically fit?
    a. absence of disease
    b. a higher quality of life
    c. improved sports performance
    d. better personal appearance
    e. maintenance of recommended body weight

Correct answers can be found on page 592.

Lab 1A Daily Physical Activity Log

Name _____ Date _____ Grade _____

Instructor _____ Course _____ Section _____

Necessary lab equipment
None.

Objective
To indicate how active you are and serve as a basis to monitor future changes.

Instructions
Record the time of day, type and duration of the exercise/activity, and, if possible, steps taken while engaged in the activity.

Date: Day of the Week:

Time of Day	Exercise/Activity	Duration	Number of steps	Comments
Totals:				

Activity category based on steps per day (use Table 1.2, page 21):

Date: Day of the Week:

Time of Day	Exercise/Activity	Duration	Number of Steps	Comments
Totals:				

Activity category based on steps per day (use Table 1.2, page 21):

Lab 1A Daily Physical Activity Log (continued)

Date: Day of the Week:

Time of Day	Exercise/Activity	Duration	Number of Steps	Comments
Totals:				

Activity category based on steps per day (use Table 1.2, page 21):

Date: Day of the Week:

Time of Day	Exercise/Activity	Duration	Number of Steps	Comments
Totals:				

Activity category based on steps per day (use Table 1.2, page 21):

Briefly evaluate your current activity patterns, discuss your feelings about the results, and provide a goal for the weeks ahead.

Lab 1B Wellness Lifestyle Questionnaire

Name _____ Date _____ Grade _____

Instructor _____ Course _____ Section _____

Necessary lab equipment
None.

Objective
To analyze current lifestyle habits and help determine changes necessary for future health and wellness.

Instructions
Check the appropriate answer to each question and obtain a final score according to the guidelines provided at the end of the questionnaire.

	ALWAYS	NEARLY ALWAYS	OFTEN	SELDOM	NEVER
1. I participate in vigorous-intensity aerobic activity for 20 minutes on 3 or more days per week, and I accumulate at least 30 minutes of moderate-intensity physical activity on a minimum of 2 additional days per week.	5	4	3	2	1
2. I avoid uninterrupted sitting for more than an hour at a time and accumulate less than 6 hours of sitting time in a 24-hour time period.	5	4	3	2	1
3. I participate in strength-training exercises, using a minimum of eight different exercises, 2 or more days per week.	5	4	3	2	1
4. I perform flexibility exercises a minimum of 2 days per week.	5	4	3	2	1
5. I maintain recommended body weight (includes avoidance of excessive body fat, excessive thinness, or frequent fluctuations in body weight).	5	4	3	2	1
6. Every day, I eat three regular meals that include a wide variety of foods.	5	4	3	2	1
7. I limit the amount of saturated fat and trans fats in my diet on most days of the week.	5	4	3	2	1
8. I eat a minimum of five servings of fruits and vegetables and six servings from grain products daily.	5	4	3	2	1
9. I regularly avoid snacks, especially those that are high in calories and fat and low in nutrients and fiber.	5	4	3	2	1
10. I avoid cigarettes or tobacco in any other form.	5	4	3	2	1
11. I avoid alcoholic beverages. If I drink, I do so in moderation (one daily drink for women and two for men), and I do not combine alcohol with other drugs.	5	4	3	2	1
12. I avoid addictive drugs and needles that have been used by others.	5	4	3	2	1
13. I use prescription drugs and over-the-counter drugs sparingly (only when needed), and I follow all directions for their proper use.	5	4	3	2	1
14. I readily recognize and act on it when I am under excessive tension and stress (distress).	5	4	3	2	1
15. I am able to perform effective stress-management techniques.	5	4	3	2	1
16. I have close friends and relatives with whom I can discuss personal problems and approach for help when needed, and with whom I can express my feelings freely.	5	4	3	2	1
17. I spend most of my daily leisure time in wholesome recreational activities.	5	4	3	2	1
18. I sleep 7 to 8 hours each night.	5	4	3	2	1
19. I floss my teeth every day and brush them at least twice daily.	5	4	3	2	1

Lab 1B Wellness Lifestyle Questionnaire (continued)

	ALWAYS	NEARLY ALWAYS	OFTEN	SELDOM	NEVER
20. I get "safe sun" exposure (that is, 10–20 minutes unprotected sun exposure to the face, neck, and arms on most days of the week between the hours of 10:00 a.m. and 4:00 p.m.), I avoid overexposure to the sun, and I use sunscreen and appropriate clothing when I am out in the sun for an extended time.	5	4	3	2	1
21. I avoid using products that have not been shown by science to be safe and effective. (This includes drugs and unproven nutrient and weight-loss supplements.)	5	4	3	2	1
22. I stay current with the warning signs for heart attack, stroke, and cancer.	5	4	3	2	1
23. I practice monthly breast/testicle self-exams, get recommended screening tests (blood lipids, blood pressure, Pap tests), and seek a medical evaluation when I am not well or disease symptoms arise.	5	4	3	2	1
24. I have a dental checkup at least once a year, and I get regular medical exams according to age recommendations.	5	4	3	2	1
25. I am not sexually active. / I practice safe sex.	5	4	3	2	1
26. I can deal effectively with disappointments and temporary feelings of sadness, loneliness, and depression. If I am unable to deal with these feelings, I seek professional help.	5	4	3	2	1
27. I can work out emotional problems without turning to alcohol, other drugs, or violent behavior.	5	4	3	2	1
28. I associate with people who have a positive attitude about life.	5	4	3	2	1
29. I respond to temporary setbacks by making the best of the circumstances and by moving ahead with optimism and energy. I do not spend time and talent worrying about failures.	5	4	3	2	1
30. I wear a seat belt whenever I am in a car, I ask others in my vehicle to do the same, and I make sure that children are in an infant seat or wear a shoulder harness.	5	4	3	2	1
31. I do not drive under the influence of alcohol or other drugs, and I make an effort to keep others from doing the same.	5	4	3	2	1
32. I avoid being alone in public places, especially after dark; I seek escorts when I visit or exercise in unfamiliar places.	5	4	3	2	1
33. I seek to make my living quarters accident-free, and I keep doors and windows locked, especially when I am home alone.	5	4	3	2	1
34. I try to minimize environmental pollutants, and I support community efforts to minimize pollution.	5	4	3	2	1
35. I use energy conservation strategies and encourage others to do the same.	5	4	3	2	1
36. I study and/or work in a clean environment (including avoidance of secondhand smoke).	5	4	3	2	1
37. I participate in recycling programs for paper, cardboard, glass, plastic, and aluminum.	5	4	3	2	1

Lab 1B Wellness Lifestyle Questionnaire (continued)

How to Score

Enter the score you have marked for each question in the spaces provided below. Next, total the score for each specific wellness lifestyle category and obtain a rating for each category according to the criteria provided below.

	Health-Related Fitness	Nutrition	Avoiding Chemical Dependency	Stress Management	Personal Hygiene/ Health	Disease Prevention	Emotional Well-Being	Personal Safety	Environmental Health & Protection
1.		6.	10.	14.	18.	22.	26.	30.	34.
2.		7.	11.	15.	19.	23.	27.	31.	35.
3.		8.	12.	16.	20.	24.	28.	32.	36.
4.		9.	13.	17.	21.	25.	29.	33.	37.
5.									
Total:									
Rating:									

Category Rating

Excellent (E) = ≥17 Your answers show that you are aware of the importance of this category to your health and wellness. You are putting your knowledge to work for you by practicing good habits. As long as you continue to do so, this category should not pose a health risk. You are also setting a good example for family and friends to follow. Because you got a very high score on this part of the test, you may want to consider other categories in which your score indicates room for improvement.

Good (G) = 13–16 Your health practices in this area are good, but you have room for improvement. Look again at the items you answered with a 4 or lower and identify changes that you can make to improve your lifestyle. Even small changes often can help you achieve better health.

Needs Improvement (NI) = ≤12 Your health risks are showing. You may be taking serious and unnecessary risks with your health. Perhaps you are not aware of the risks or what to do about them. Most likely you need additional information and help in deciding how to successfully make the changes you desire. You can easily get the information that you need to improve, if you wish. The next step is up to you.

Please note that no final overall rating is provided for the entire questionnaire, because it may not be indicative of your overall wellness. For example, an excellent rating in most categories will not offset the immediate health risks and life-threatening consequences of using addictive drugs or not wearing a seat belt.

Lab 1C Health History Questionnaire

Introduction

Although exercise testing and exercise participation are relatively safe for most apparently healthy individuals, the reaction of the cardiovascular system to increased levels of physical activity cannot always be totally predicted. Consequently, there is a small but real risk of certain changes occurring during exercise testing and participation. Some of these changes may be abnormal blood pressure, irregular heart rhythm, fainting, and in rare instances a heart attack or cardiac arrest. Therefore, you must provide honest answers to this questionnaire. Exercise may be contraindicated under some of the conditions listed below; others may simply require special consideration. **If any of the conditions apply, consult your physician before you participate in an exercise program.** Also, promptly report to your instructor any exercise-related abnormalities that you may experience during the course of the semester.

A. Have you ever had or do you now have any of the following conditions?

- ☐ 1. A myocardial infarction
- ☐ 2. Coronary artery disease
- ☐ 3. Congestive heart failure
- ☐ 4. Elevated blood lipids (cholesterol and triglycerides)
- ☐ 5. Chest pain at rest or during exertion
- ☐ 6. Pain in the chest that may radiate to the jaw, shoulders, arms, or between the shoulder blades
- ☐ 7. Shortness of breath or difficulty breathing
- ☐ 8. An abnormal resting or stress electrocardiogram
- ☐ 9. Uneven, irregular, or skipped heartbeats (including a racing or fluttering heart)
- ☐ 10. A blood embolism
- ☐ 11. Thrombophlebitis
- ☐ 12. Rheumatic heart fever
- ☐ 13. Elevated blood pressure
- ☐ 14. A stroke
- ☐ 15. Diabetes
- ☐ 16. A family history of coronary heart disease, syncope, or sudden death before age 60
- ☐ 17. Fever
- ☐ 18. Chills
- ☐ 19. Sore throat
- ☐ 20. New state of confusion
- ☐ 21. New loss of taste or smell
- ☐ 22. Muscle pain not related to overexertion
- ☐ 23. Blue lips or face
- ☐ 24. Inability to wake or stay awake
- ☐ 25. Any other heart problem that makes exercise unsafe

B. Do you have any of the following conditions?

- ☐ 1. Arthritis, rheumatism, or gout
- ☐ 2. Chronic low back pain
- ☐ 3. Any other joint, bone, or muscle problems
- ☐ 4. Any respiratory problems
- ☐ 5. Obesity (more than 30 percent overweight)
- ☐ 6. Anorexia
- ☐ 7. Bulimia
- ☐ 8. Mononucleosis
- ☐ 9. Any physical disability that could interfere with safe participation in exercise

C. Do any of the following conditions apply?

- ☐ 1. Do you smoke cigarettes or use any other tobacco- or nicotine-containing products?
- ☐ 2. Are you taking any prescription drugs?

D. Do you have any other concern regarding your ability to safely participate in an exercise program? If so, explain:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____