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# Foundations for **PERSONAL HEALTH**

3rd Edition

Barbara Lockhart, Ed.D., and Ron Hager, Ph.D.



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# Foundations for Personal Health

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My fault, my failure, is not in the  
passions I have, but in my lack of  
control of them.

— Jack Kerouac



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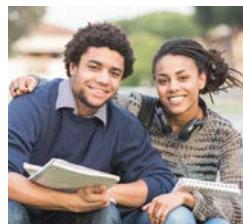
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## Establish a Healthy Concept of Self **Who Am I?**

Because of the recent pandemic and other contemporary challenges, living a healthy lifestyle is no longer a luxury but a necessity. It is crucial to every part of our lives. Thankfully, we know so much more now about living a healthy lifestyle than we ever have before. Much of this knowledge has come to us in just the past few years. For example, scientists and researchers have determined that certain kinds of lifestyle choices—such as smoking, not exercising, eating poorly, and not

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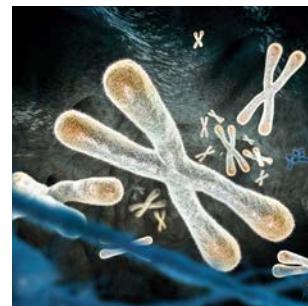
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getting enough sleep—are responsible for about 80 percent of all illnesses. For the most part, this means your good health is in your hands. No matter your age, income, or other circumstances, you can make a difference to your health and the health of those around you. A major recent advance in knowledge is grounded in the evidence that everything we do affects the body, the mind, and our emotions—or spirit—as they all function as one whole unit. This approach to wellness will enhance your ability to live your life with a balance and harmony of all aspects of you. This is truly the key to good health and wellness.



## After reading this chapter, you will be able to:

- › **EXPLAIN** how the dynamic interaction between mind and body impacts wellness.
- › **DESCRIBE** the concepts of immaterialism, materialism, and holism.
- › **UNDERSTAND** how self-perception affects your wellness.
- › **PROVIDE** a clear, working definition of wellness, and explain how the definition of wellness has evolved over time.
- › **IDENTIFY** the factors that affect your health and wellness.



**Figure 1.** Wellness is living in harmony and balance with all dimensions of you.

# **WHO AM I?**

establish a healthy concept of self

# SCIENCE OF THE MINDBODY CONNECTION

Do you ever have trouble sleeping because your body won't relax and your mind is racing? Has anyone told you how cranky and mean you can be when you're hungry or tired?

By doing a lot of scientific research, neuroscientists, cardiologists, immunologists, and other scientists found that the human body and the mind are inextricably linked and function as an integrated unit. The brain does not act separately from the rest of the body; the body does not function separately from the mind. Scientists now speak of the integrity of the organism, the connection between the mind and body, and how all dimensions of an individual are interrelated to affect overall wellness (*Figure 1*).

# Memories Stored in the Body's Cells

Here's an example of how closely the body and mind are entwined. Research shows that memories are stored in cells throughout the body, as well as in the brain. Traumatic experiences, such as the death of a loved one, is an example to which most people can relate. During the grieving process, many people experience physical pain as well as emotional pain.

Many people in mourning report pain in the lower back or some other part of the body. There is mounting evidence that we place the memory of emotional events in physical storage—not just mental storage—throughout the nervous system and throughout the body. The interconnectedness of mind and body, or mindbody, helps us comprehend how experiences of the mind affect the body and experiences of the body affect the mind.

Knowing this totality of the functioning of our being, we are in a position to make choices to effectively generate wellness. This communication is the mindbody's intelligence, an intelligence that enables us to take care of our own health and not be overly dependent on others.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Molecules of Emotion

These exciting understandings of who we are and how we function are due, in part, to the excellent pioneering laboratory science of research pharmacologist Dr. Candace Pert (1946–2013). Pert published over 250 scientific articles on peptides and their receptors and the role of these neuropeptides in the immune system.

Her popular book, *Molecules of Emotion*, provides scientific details in lay terms regarding the role of emotions in the psychobiology of health and wellness. She described her research as a journey into how the mind, body, and spirit are inseparable. This is not the old “mind-over-body” paradigm. Rather, her research led her to conclude that “mind does not dominate body, it becomes body. The body and mind are one.” She was often heard to say that the body does not exist just to carry the head around!

Pert preferred the term *mindbody* to describe who we are. Her research into opiate receptors, endorphins, and peptides showed that the brain, glands, and immune system are constantly functioning together. The neuropeptides and their receptors function as a lock-and-key mechanism. The key entering a specific lock is affected by feelings. If you suppress your feelings and don't express them, the cellular lock and key are going to be blocked and inhibit the work of the immune system, which is our main defense against disease.

Neuropeptides and their receptors are at every level of our being and are the biochemical molecules of emotion or messengers that communicate information throughout a network that links all of our systems and organs. And the communication goes both ways. According to Pert, “Immune cells not only control tissue integrity of the body, but they also manufacture information chemicals that can regulate mood or emotion.”

## Psychoneuroimmunology

These ideas have contributed significantly to the establishment of ***psychoneuroimmunology (PNI)***, which studies how thoughts and feelings affect the functioning of cells. It has motivated scientists to pursue cutting-edge research concerning the intricacies of how the mind and body function as one whole. This

work continues to influence the development of treatments for myriad disorders, including Alzheimer's, Parkinson's, and Huntington's diseases, as well as spinal cord injury, epilepsy, hypoxia, and autism.

There are many specific examples of the mind and body functioning as mindbody, or as one entity. Other chapters in this textbook explore many of these specific topics, but by way of introduction we briefly look at three examples here:

- The presence of neurotransmitter receptors in the gut.
- The harmful effect of negative psychological stress on cellular health.
- The interactions between the brain and the immune system.

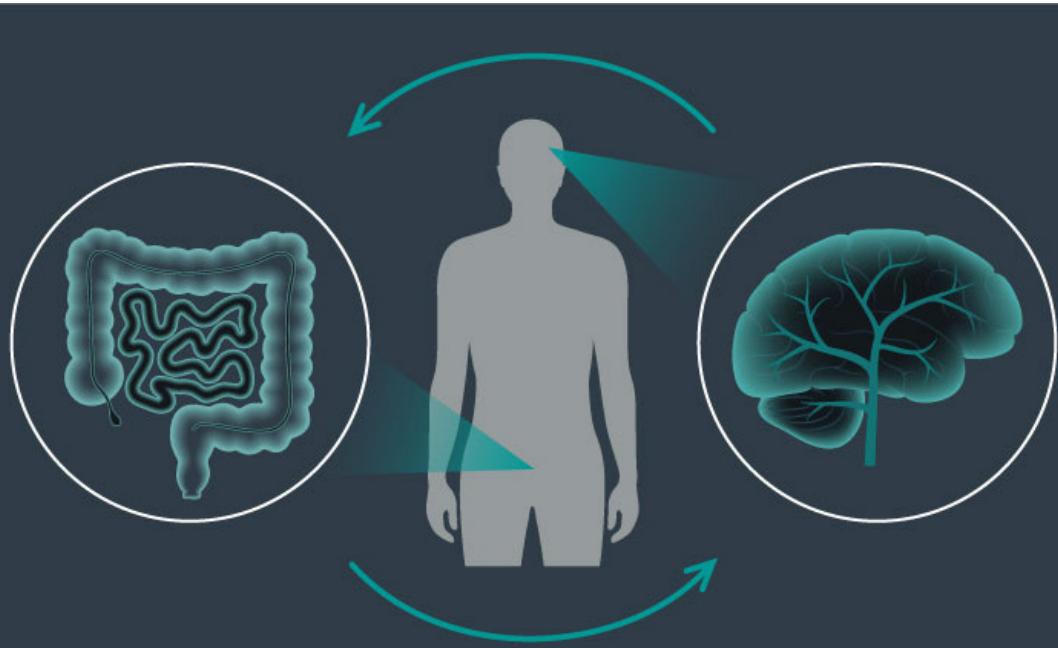
“ This body-wide information network is constantly changing, and dynamic, infinitely flexible. It is one gigantic loop, directing and admitting information simultaneously; intelligently guiding what we call life. ”

—Dr. Deepak Chopra

## There's a Brain in Your Belly

When you are happy or in love, you probably have experienced a funny sensation in your stomach, a feeling of well-being. When you have separated from a loved one, you felt your chest hurt, as though your heart itself were aching. Have you wondered why these intense feelings or thoughts are not restricted to your brain, but instead are felt in your body, particularly your belly?

Dr. Michael Gershon, a professor at Columbia University and leader in the field of neurogastroenterology, determined that the gut uses some of the same **neurotransmitters** as the brain. The **enteric nervous system (ENS)** is the “brain in the belly” and neurotransmitters, such as serotonin, play a role in digestion. Over 80 percent of the body’s serotonin (a neurotransmitter often associated with feelings of well-being and known as the “happiness hormone”) is actually found in the bowels. Gershon named his findings the “second brain” (*Figure 2*).



**Figure 2.** Those happy thoughts that you feel are not just in your head; they are transmitted throughout your body, especially in the “brain” in your belly.

Both doctors and psychologists need to help patients understand the big brain, in the head, and the little brain, in the gut. Serotonin reuptake inhibitors (SSRIs) are natural neurotransmitters that communicate between brain cells and are used in antidepressant medications to block the re-uptake of serotonin. Blocking serotonin in this way can help improve mood. Did you know these serotonin-based anti-depressants are also being used to alleviate gastrointestinal disorders? This is just one example of how our “two brains” are constantly communicating and are useful to each other.

## Too Much Stress Can Make You Age Faster

Have you ever had a parent show you the gray hairs you gave them or tell you that you have taken several years off their lives? Well, the science is finding that stress and anxiety may cause aging. Consider an article by Janice Kiecolt-Glaser and Ronald Glaser, who have been researching the mind and body for over 30 years at Ohio State University. Their research found that the psychological stress placed on caregivers advances the aging of their cells and may shorten their lives by years.

## The Role of Telomeres in Aging

**Telomeres** are DNA protein complexes that help stabilize a cell’s chromosomes (*Figure 3*). **Telomerase** is an enzyme that repairs damage to the chromosome. As part of the aging process, cells’ telomeres become shorter and telomerase functions less effectively.

THE SCIENCE OF THE WHOLE INDIVIDUAL

# Psychoneuroimmunology Research Society

A good way for scientists to stay up-to-date with current research findings is through the Psychoneuroimmunology Research Society ([www.pnirs.org](http://www.pnirs.org)) and their official journal, *Brain, Behavior and Immunity*. The main purpose of the Society is “to promote the study of interrelationships among behavioral, neural, endocrine and immune processes and encourage collaborations among immunologists, neuroscientists, clinicians, health psychologists, and behavioral neuroscientists.” With a focus on the relationship between behavior and health, the Society encourages basic science research that can assist people to enjoy a greater level of wellness of mind and body.



In one study of caregivers that compared them to non-caregivers (who were matched for age, gender, and other factors), the caregivers’ telomeres were shorter and the telomerase functioned poorer. The caregivers’ lifespan was four to eight years less than the non-caregivers. Higher levels of depression and indicators of poor immune functioning in the caregivers led to significant discoveries in how psychological stress can harm the body.

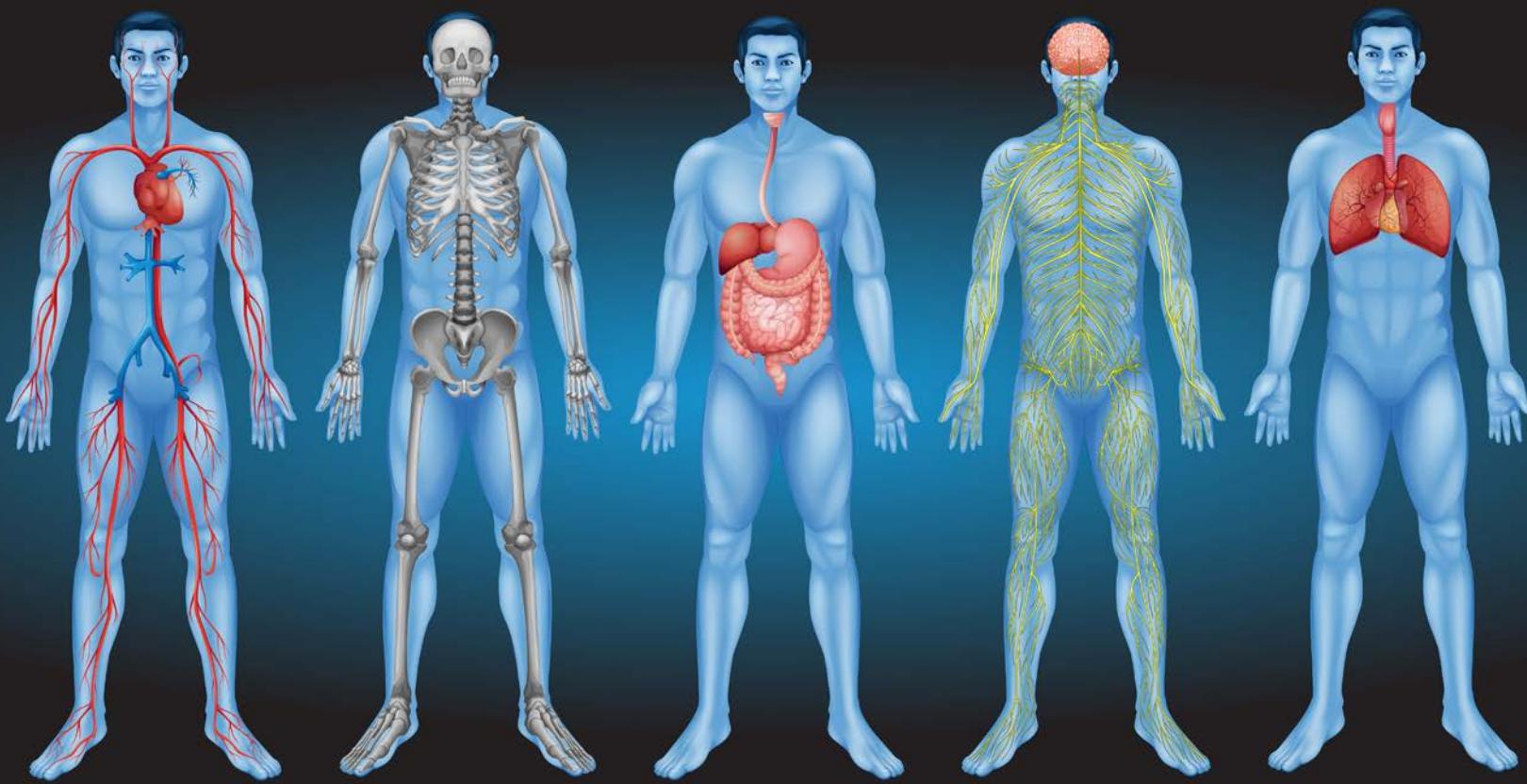


**Figure 3.** Telomeres appear as red tips on the chromosome.

## The Mind's and Body's Systems Work Together

Years ago, it was thought that the immune system only functioned within itself; in other words, it was believed to be a closed system. Recent discoveries have proven that the central nervous system, the immune system, and other systems work together in a dynamic way. The autonomic nervous system innervates the thymus, bone marrow, spleen, and lymph nodes, and causes the endocrine glands to secrete hormones into the blood and organs. This means that the mind and body are constantly interfacing.

The purpose of the basic science of psychoneuroimmunology is to uncover the specific actions occurring in the brain and the systems and organs of the body (*Figure 4*). These are highly complex interactions that are very challenging to study. The research also demands scientists to expand their knowledge and extend beyond their highly specialized focus because it requires a multidisciplinary approach. It is a fascinating blending of the sciences of the mind and the sciences of the body.



*Figure 4.* Psychoneuroimmunology is a multidisciplinary science that studies the functioning of the whole individual.

## Physical Activity Can Make You Smarter

Because of the integrated functioning of mind and body, when you take care of your body, you are taking care of your brain. Exercise has been found to play a key beneficial role in neurogenesis, the process by which new brain cells or neurons are generated. Scientists have identified two areas of the brain in which stem cells can develop into new brain cells. It wasn't until 1998 that neurogenesis was proven to be a reality in adult humans. Prior to that time, it was thought that loss of brain cells accompanied aging and there was nothing that could be done about it.

## Building the Brain's Capacity to Change and Adapt

Much of brain research has focused on important neurotransmitters, but in the past several decades, another class of protein molecules that build cells has been more fully researched. One prominent protein, **brain-derived neurotrophic factor (BDNF)**, has been found to nourish neurons. BDNF plays a key role in synaptic plasticity. **Neuroplasticity**, or brain plasticity, is the capacity of the brain to be flexible, change, or adapt. BDNF stimulates positive synaptic adaptation by increasing the number of synapses and binding with receptors and activating genes within the cell to produce more BDNF and other molecules that strengthen the synapses and also the immune system.

There is a tie between BDNF functions and learning. BDNF improves the cellular structure that in turn creates the mechanism for improved learning. And, you guessed it, exercise enhances the production and effectiveness of BDNF. John Ratey, MD, associate clinical professor of psychiatry at Harvard Medical School, acknowledged that one physical educator said to the other teachers, "I'll build the brain cells—you fill them."

Scientists in the University of Muenster Department of Neurology demonstrated that high-intensity interval exercise produced greater amounts of BDNF than low-impact running. When the researchers combined the physical activity with a learning activity, they discovered that the subjects learned 20 percent faster after the interval exercise. The researchers concluded that BDNF, dopamine, and epinephrine produced during exercise improve learning (*Figure 5*).



**Figure 5.** Research has found that exercise will help nourish your brain, which will enable you to function better in all parts of your life.

## Link Between Physical Activity and Brain Cell Development

Fibroblast growth factor (FGF-2) and vascular endothelial growth factor (VEGF) are additional proteins that, among many other functions, stimulate mitosis or the development of new cells. Muscles that are contracted during exercise release FGF-2 and VEGF.

In addition to neurogenesis, FGF-2 and VEGF contribute to building new blood vessels, specifically new capillaries. Several studies conducted at the University of Illinois concluded that aerobic fitness activity increases brain volume and helps attenuate the expected loss of brain tissue due to aging. When heart and lungs are taxed, individuals not only experience greater cardiovascular health but also a reduction in brain matter loss.

Exercise also increases levels of insulin-like growth factor (IGF-1), which regulates insulin in the body and improves synaptic plasticity in the brain. IGF-1 is a hormone released by the muscles, which works with insulin to supply cells with glucose, a main energy source for muscles and the brain. IGF-1 helps to fuel muscles but when it acts in the brain it helps us learn.

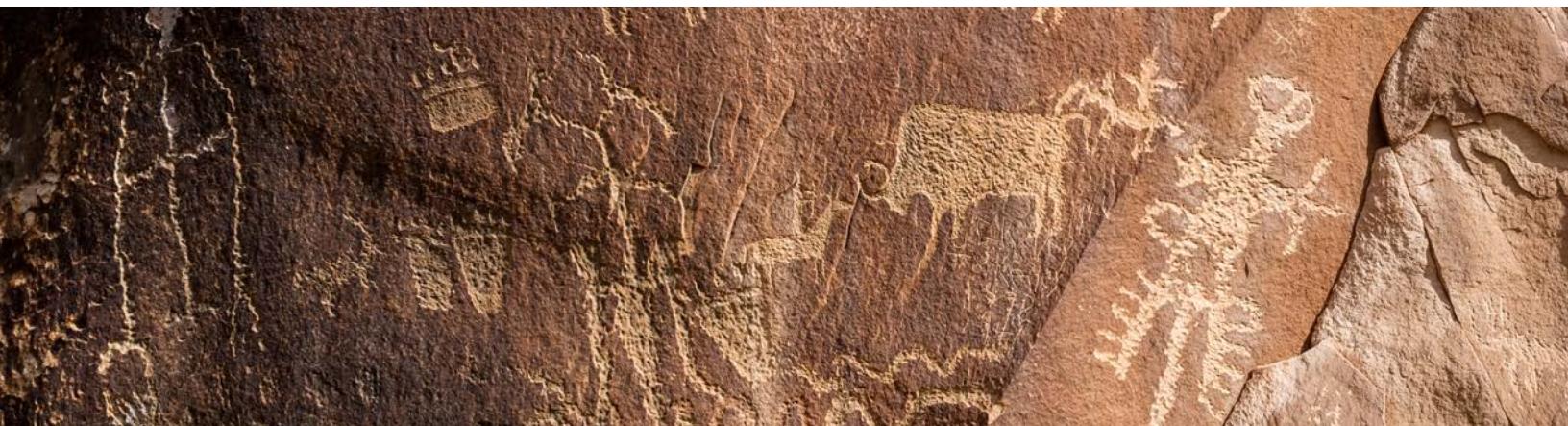
Long-term potentiation (LTP) is the dynamic action of neurons that results in learning. With more neurons in place, the greater the neuronal activity and connections the more capacity for learning. The brain's abilities to learn and remember, execute higher thought processes, and manage emotions are all improved at a cellular level because of physical activity. These dynamics and more are discussed in greater depth throughout this book.

## OUR VIEW OF OURSELVES MATTERS

Healthy people tend to have a healthy understanding of self—one that integrates the body and the mind and views the body positively. With the scientific evidence we have that makes it so clear that the mind and body function as one, don't you want to go run or lift weights before you study? Hopefully, that is the case but oh, if it were that easy. So many of these scientific breakthroughs regarding how our minds and bodies are interrelated have occurred within the past few decades. How do they affect attitudes toward the body? What impact do our attitudes toward our bodies have on the integration of body and mind? What impact do they have on wellness?

Brain-imaging techniques and various new forms of technology have been instrumental in giving us scientific evidence of the interactive nature of mind and body. Conceptualizing the body and mind as functioning in a unified manner seems to make perfect sense and yet this concept is based on new discoveries. In many cases, as was true of Gershon's work on the second brain, researchers have been surprised by the results. Why haven't we made these discoveries before? Granted, a large part of the reason is new technology, particularly for the brain studies, but historical, cultural, and religious worldviews regarding the mind and the body have greatly influenced our thinking and continue to do so today.

Discussions on the nature of the human being—that is, the question of who we are—go back as far as the beginning of written records (*Figure 6*). In contemporary introductory philosophy texts, the essays about the nature of our being are often posited as the mind versus body dilemma. Considering our scientific understanding, it may very well be that these essays will be rewritten in the not-too-distant future. Why subscribe to mind versus body, as if our nature is composed of two opposing entities, rather than two aspects of being working together as one?



**Figure 6.** The question of who we are appears in the earliest written records.

# Evolution of Thinking About Ourselves

The way in which we view ourselves is foundational to our wellness. Understanding the nature of human life is a highly complex matter with enormous variations in accepted sources of knowledge and types of beliefs. Beliefs about the origin of life and concepts about if and what life continues beyond mortality impact beliefs about the mind and body. How we look at these ideas will seem very simplistic to the sophisticated philosopher, but we want to make it workable in the confines of this book and relevant to our focus on wellness, including your body and your mind.

There are three major concepts regarding the nature of being that impact wellness. These views of who we are address the questions of whether the mind and body exist independently of one another or whether they are interdependent aspects of one whole. These worldviews are stated in the first person:

- I am only my mind (immaterialism).
- I am only my body (materialism).
- I am my mind and my body (holism).

## I Am Only My Mind (Immaterialism)

If one thinks, "The reality of my being is the mind only; the body is some entity that is not really who I am," then this person has been influenced by the philosophy called **immaterialism**. This worldview is centuries old yet continues to influence attitudes about the nature of human life. Immaterialism holds that the mind is not composed of matter. Therefore, the body, obviously material, is not really the person. The body may be thought of as just a casing or housing that will eventually be discarded—leaving the real, inner immaterial self as the true being (*Figure 7*).



*Figure 7.* Immaterialism says that the body is just a casing for one's true being.

Plato (428–348 BC), in some of his writings, contended that the body was a prison of the spirit, a detriment to perfection, a hindrance to wisdom and knowledge. He explained that because the mind is immaterial, it is superior to the material body and, in fact, is inhibited by the body. In Plato's other writings, he took a more positive view of the body. However, those who came after him, referred to as Neo-Platonists, took the body-as-prison concept to the extreme.

Asceticism is a Neo-Platonist belief that a person must deny the body to free the mind. The life of an ascetic was characterized by self-inflicted physical torture such as extreme fasting, lying on a bed of nails, and general denial of the physical for the purpose of freeing or refining the mental or spiritual aspect of being. In asceticism, the bodily foe is not only to be overcome, but also to be eliminated.

**Cartesian dualism** is the outlook of philosopher René Descartes (1596–1650). Descartes ascribed reality to both the mind and the body, establishing his dualistic concept of human nature. In his famous statement, "I think, therefore I am," Descartes put forth the immaterial mind as the ultimate reality of human life.

However, he maintained that the body is also real, but it is a lesser, antagonistic reality. His concept of the nature of human life that pits the body against the mind has been incorporated into many worldviews. This thinking that the body is an enemy to the mind firmly established the separation of mind and body. The body became a thing to be overcome by the mind, a foe to be vanquished.

If even emotions have molecules or material substance, how could something that is real be immaterial? It is odd how it works but thinking that there is such a thing as an immaterial reality serves to make that which is composed of matter a questionable reality. The immaterial takes on the position of being superior, somehow purer than that which is simply matter. In the case of the nature of human life, the mind or spirit gets elevated over the body in the immaterialist's view. The mind and body are seen as opposites and eventually even antagonists, the one fighting the other. In this perception of human life, the mind and body are not alike, one being immaterial and the other material.

## I Am Only My Body (Materialism)

**Materialism** is the opposite worldview of immaterialism. While immaterialism ascribes reality only to the mind, materialism designates reality just to the body. If a person thinks, "The reality of my being is my body only," then that person has been influenced by materialism.

In this philosophy, the body is not independent of the person whose body it is, rather a person is his or her body. German philosopher Friedrich Nietzsche (1844–1900) advanced this theory: "Body am I entirely and nothing else; and soul only a word for something about the body." Nietzsche's view of the self as only the body left no room for any kind of conscience. Materialism claims that thinking and feeling are not attributed to a mind but are bodily in nature.

Scientists, of course, study atoms, but there is also a philosophy called atomism that maintains only atoms exist. This is a specific form of materialism that can be found in Eastern as well as Western traditions. In his book *The Story of Civilization: Our Oriental Heritage*, Will Durant explains that the Buddhist form of atomism focuses on atoms as they appear in the four standard elements: earth, water, air, and fire. Two Indian philosophies are based in atomism. The Jains believed that all atoms produce different effects, even though they have a similar composition. The Vaisheshika philosophy held that the composition of the atoms varied with the composition of the elements.

B. F. Skinner (1904–1990) described behavior in terms of stimulus and response action, in the pattern of Pavlov's famous studies with dogs, bells, and salivation. Skinner believed that the human being is simply a form of animal life. He taught that human behavior is a response to stimuli in the environment and that there is no means for an individual to have thoughts other than those that respond to a stimulus, such as money. The anatomical brain constitutes the mind.

Materialism's claim that a person is just a body eliminates the supposed contention between mind and body by eliminating mind altogether. Removing mind from the equation reduces the human to a physical existence (*Figure 8*).



**Figure 8.** Materialism says that we are just a body, and our behaviors are reactions to environmental stimuli.

## I Am My Body and I Am My Mind (Holism)

If a person thinks, "I am my body and I am my mind," then that person has been influenced by holism. Holism in philosophy maintains that the whole is greater than the sum of its parts. The term *holistic*, as it applies to medicine and healing, has become popular in the genre of psychoneuroimmunology and behavioral medicine. The focus of this way of thinking is on the whole person and the way human systems interrelate and interface with one another. The mind and body in holism are more alike than different and work together to constitute our human reality. The reality of human life is mind and body together, not just one aspect or the other.

Holism is conducive to wellness because it acknowledges the reality of the mind and the body. It sees the mind and body as compatible because of their likeness and that they are comparable in importance. This way of looking at life encourages a positive acceptance of the body as well as the mind.

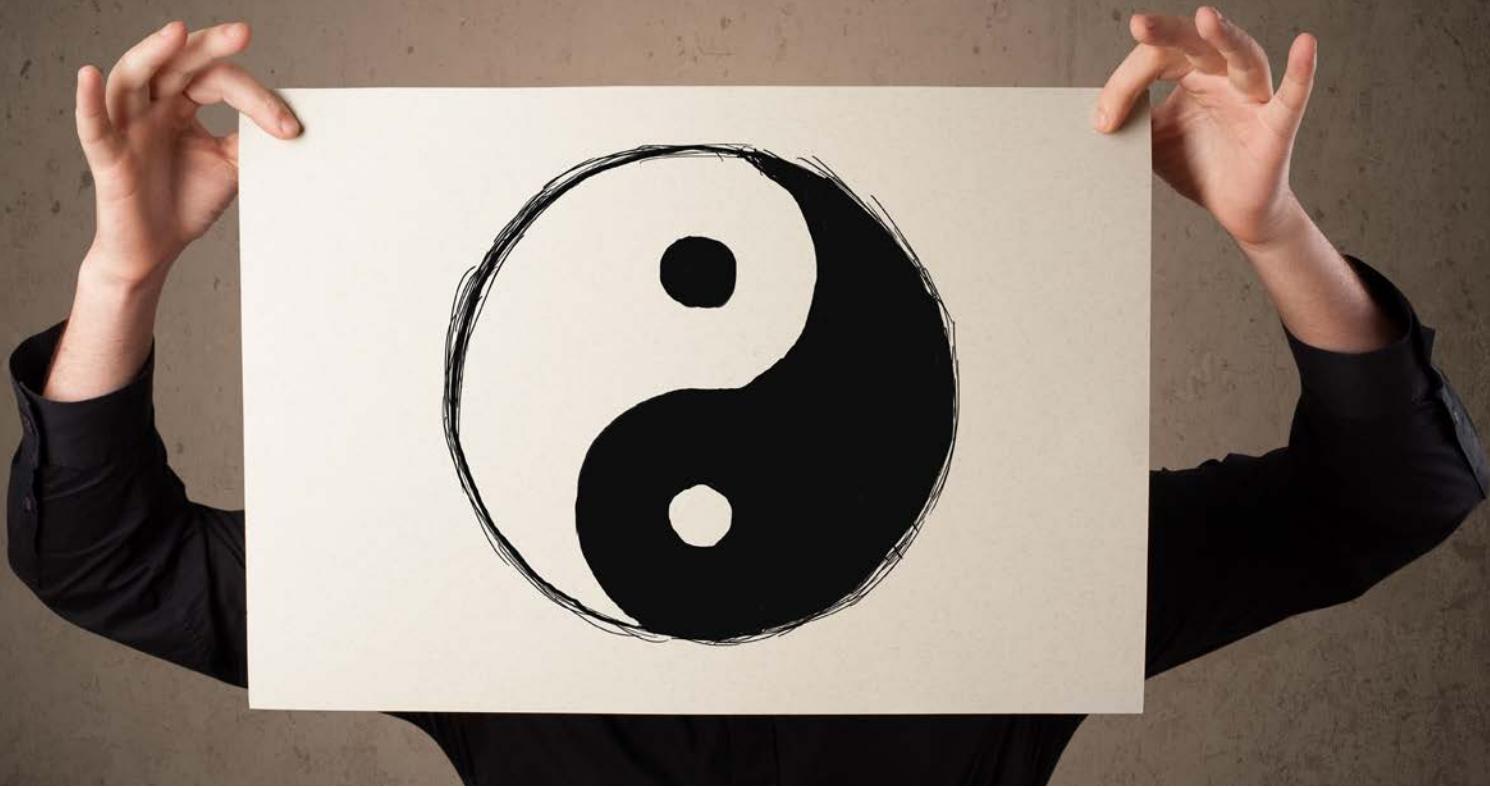
## Holism and Healing

**Traditional Chinese medicine (TCM)** is a systems approach focusing on bodily functions, such as breathing, circulation, temperature, and digestion. Chi is a vital life force that streams through the meridians or energy channels in the body. When the systems are in balance, the chi flows freely, which results in good health and wellness. Ill health comes about when chi is blocked or restricted and the systems are not in balance.

The Taoist philosophy of Yin and Yang, the major belief system underlying TCM, gives depth to the understanding of balance. Everything in the universe is regulated by the interaction of Yin and Yang. In theory, all things are parts of a whole in which Yin and Yang are polar complements. Yin is the shady side of the slope and Yang the sunny side of the slope (*Figure 9*).

Harvard professor and medical researcher Ted Kaptchuk explains that Yin qualities are cold, rest, responsiveness, passivity, darkness, tranquility, completion, and realized fruition, while yang is associated with heat, stimulation, movement, activity, excitement, vigor, light, beginning, and dynamic potential. According to Kaptchuk, "Yin and Yang create each other, control each other, and transform into each other."

These ideas are being successfully implemented in healing practices. For example, an increasing number of people are turning to complementary and alternative medicine (CAM) for treatment of back pain. A major reason cited by patients for using CAM was that conventional medical treatments were not effective. Sixty percent of those reported having used CAM for back pain said that it benefited them a great deal.



**Figure 9.** Yin and Yang complement one another to balance the universe.

## Complementary Alternative Medicine

Use of herbs for healing is a common practice in TCM. One population study reported that nearly one in five Americans used herbs for head or chest colds, stomach or intestinal illness, or musculoskeletal conditions. Most often mentioned herbs were Echinacea, ginseng, gingko, and garlic. The research noted the factors associated with those who chose to use herbs were the high cost of conventional medicine, poor health, and being 25–44 years old.

The National Center for Complementary and Integrative Health (NCCIH) is 1 of 27 institutes of the National Institutes of Health (NIH). In recent years NCCIH dispersed approximately \$150 million annually for the funding of research, training, and career development. Selected areas of funding include treatment for depression for patients with Parkinson's disease, tai chi for chronic heart failure, effects of massage on the immune system of preterm infants, and funding for the research center on the neurobiology of acupuncture and the developmental center on chiropractic manipulation.

## Integration of Body, Mind, and Environment

Wellness is about your body and your mind. Science has taken us to the point of understanding how integral the working of the mind and body really are. We have explored numbers of examples of the way the mind and body function as one. Further scientific research will provide even more evidence of the interrelatedness of mind and body.

History and philosophy across world cultures give us insight into major perceptions regarding the nature of human life. Learning from the experience of others can help avoid or erase stumbling blocks that may create perplexity about the reality of mind and body. These worldviews provide a framework for deliberate introspection. It will become even more evident as you continue your journey in *Foundations for a Healthy Lifestyle* that a basic understanding about who we are is a key to more fully comprehending individual health and wellness. Together, history, philosophy, and science are leading us forward in the mindbody wellness paradigm.

## WELLNESS IN THE 21ST CENTURY

Today, **wellness** is defined as a state of being that maximizes your quality of life and contributes as much as possible to the well-being of the community around you. Well-being is internal harmony, optimal energy, and aliveness.

Wellness is more than just avoiding disease; living well captures the desire and the capacity to thrive. The World Health Organization (WHO) defines health as the "optimal state of health of individuals and groups." The National Wellness Association (NWA) defines wellness as "an active process of becoming aware of and making a more successful existence."

The **wellness paradigm**, which is really a way of viewing life, begins with the recognition that each of us is a complex being composed of mind and body functioning as a unified whole. The essence of wellness is a healthy integration of mind and body that results in health, fitness, and overall well-being (*Figure 10*).



**Figure 10.** Wellness is a state of complete physical, mental, and social wellness.

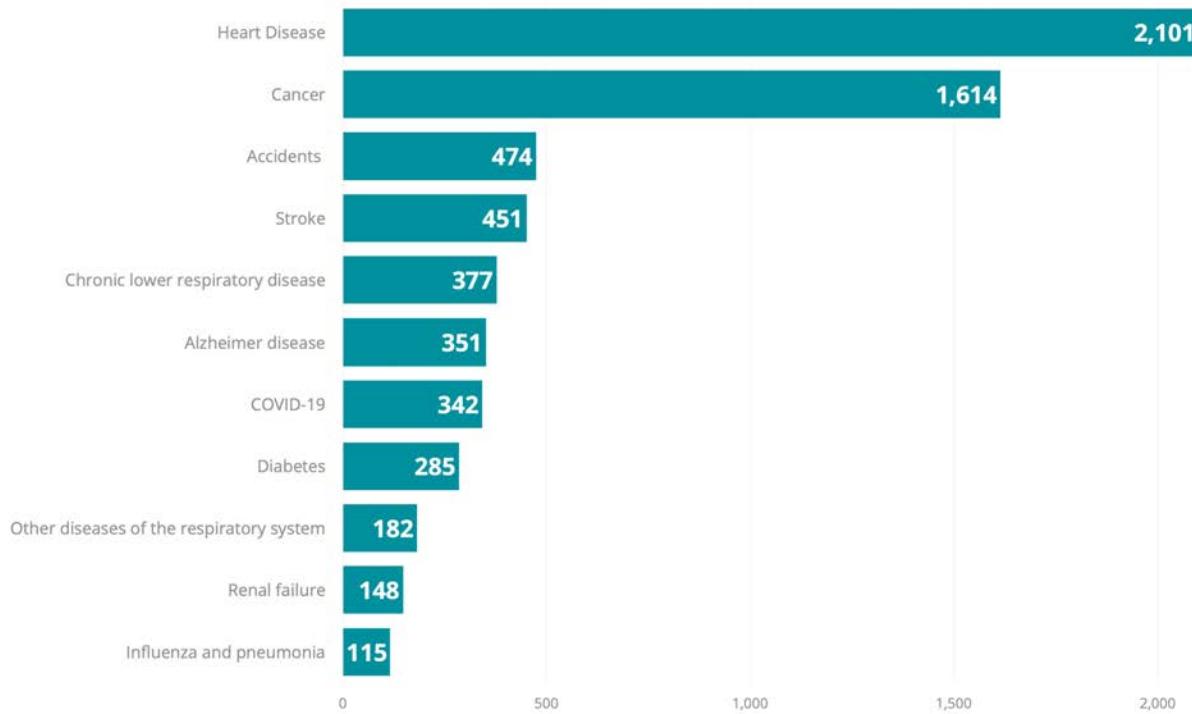
Old fitness and wellness paradigms focused on the abilities of the physical body. Physical strength and speed were measured. A person's fitness was measured by how many push-ups they could do or how far they could run. Many other parameters were measured along with motor skills and athletic prowess. With all this attention on the physical, it was not unusual to treat the body as if it was an entity apart from the mind, thoughts, and feelings. Even with all the good this physical fitness approach has achieved, we now realize that it is quite limited.

## The Evolution of Wellness

For many generations, the average life expectancy for Americans was less than 50 years. Today it is not unusual for men and women to live into their 80s or 90s with few debilitating problems. This change is primarily due to lifestyle. Because of major advancements in the treatment of disease and environmental improvements in sanitation and water purification, people today do not die as frequently from tuberculosis, pneumonia, or other infectious diseases.

**Chronic diseases**, such as heart disease, stroke, cancer, and diabetes, are the leading causes of death today (*Figure 11*). These diseases have long-lasting effects and there is often no cure, and they are largely affected by one's lifestyle choices. It is estimated that about 80 percent of older American adults have at least one chronic condition, 50 percent have at least two, and approximately 95 percent of older adults' health care expenditures are used to treat chronic diseases. Basically, most of what impairs people's health today are diseases that often result from lack of exercise, lack of sleep, poor eating habits, smoking, drinking, and the negative effects of stress. Choosing to live a healthy lifestyle is not only wise but a powerful way to enjoy quality of life and longevity.

### AVERAGE DAILY CAUSE OF DEATH IN U.S. JUNE, 2021



**Figure 11.** Average daily deaths in the United States in 2021. The COVID-19 daily average deaths are for June 1–June 28, 2021, based on the KFF COVID-19 Tracker data. Average daily deaths for causes other than COVID-19 are from the CDC from the beginning of 2021 to the last week of April 2021. Source: [KFF analysis of CDC mortality and KFF COVID-19 Tracker data](#)

It is estimated that by 2030 the proportion of people over 65 will increase to 19.6 percent of the population and the number of people over 80 will double from the current number, reaching about 20 million, including nearly equal numbers of men and women. In this aging population, racial and ethnic minorities have poorer health than non-minorities. These trends in aging present a major public health challenge facing the country in this century. The economic factor is significant as health costs of treating older adults can be three to five times higher than for people under 65. One of the highest priorities for the Centers for Disease Control (CDC) is to increase the number of older adults who live “longer, high-quality, productive, and independent lives.” The CDC claims that this goal will be accomplished by helping people adopt healthier behaviors and by obtaining regular health screenings.

## Why Starting Young Matters

COVID-19 has certainly changed the global health landscape. However the same transition from acute illness to chronic disease and degenerative conditions as the leading cause of death is taking place in many countries around the world. The World Health Organization is working to promote active aging so people can experience wellness throughout life and continue to contribute to society.

**Active aging** is a process that enables people to maximize opportunities for health, participation, and security so that they can maintain quality of life as they age (*Figure 12*). It applies to both individuals and population groups. Active aging includes being physically active and capable of working. It also includes the capacity to be involved in social, economic, cultural, spiritual, and civic affairs.

In a comprehensive analysis of the National Longitudinal Survey of Youth (NLSY) covering the years 1988 to 2006, it was observed that this shift from acute illness to chronic disease has also been occurring in children. A major concern is the growing number of children who are overweight or obese, which leads to chronic conditions including diabetes, hypertension, and high cholesterol, formerly only observed in adults. In 2020 NIH reported that they have observed a 4.8% annual increase in type 2 diabetes in youth over the past several years. Another major concern is that most alcohol, tobacco, and drug use begins early in life.



**Figure 12.** Healthy diet, exercise, and participation will help you age well and live longer.

## Importance of Active Lifestyles

Population studies have reflected the importance of active lifestyles. Researchers are discovering more details about how lifestyle actually affects us on a cellular level. Earlier in this chapter, we discussed telomere shortening occurring in caregivers. Telomere shortening may also be associated with many types of cancer and cardiovascular disease. Researchers have discovered that lifestyle factors improve cell health by increasing telomerase, the enzyme that counters telomere shortening and premature aging and death by repairing and lengthening telomeres.

In one study, subjects ate a diet low in refined sugars and rich in whole foods, fruits, and vegetables with only 10 percent of calories derived from fat. They also performed moderate aerobic exercise, relaxation techniques, and breathing exercises. As a result they experienced a 29 percent increase in telomerase in three months. They also reported lower stress and decreased levels of LDL cholesterol.

## What Does Wellness Encompass?

Wellness is a dynamic state of our being characterized by the balance and integration of our whole physical, mental, emotional, spiritual, and social self. The path to wellness is the incorporation of healthy choices in our day-to-day living. Wellness is a lifelong process that is unique to the individual but also can be shared by several people or a whole community.

The wellness focus on harmony of being is a major difference in the mindbody integrated wellness paradigm from the former fitness paradigms. Rather than focusing on the individual person, the former focus tended to be on the performance. The former paradigm favored those who were naturally good athletes.

Those who were not as skilled in sports or dance or who did not already have a good level of physical fitness tended to be overlooked. Integrated wellness is inclusive of every individual because the focus is on you, learning what you need, to choose and enjoy wellness. Ideally, this paradigm has the potential to be motivating to each and every one—mind and body!

## Wellness Paradigm Shift

A paradigm is a model or pattern that describes how we perceive things in the world around us. A paradigm shift means we see things in a new way. The famous 19th century drawing “My Wife and My Mother-in-Law” has been used to get this point across. Look at *Figure 13*. Do you see an old woman or do you see a young woman? Take another look. You should be able to see two images of a woman. The illustration is meant to challenge your perceptions. How often do you challenge your view of the world around you or your view of yourself?

As the concept of wellness was in the process of being developed, we moved from the former physical fitness paradigm to the mindbody integrated wellness paradigm. The scientific advancements we have discussed ready us to embrace the new paradigm. Prior to these discoveries, as people contemplated that wellness is more than physical fitness, they postulated that the physical, social or interpersonal, emotional, intellectual, spiritual, environmental, and occupational were all dimensions of wellness. These make sense in that they are an expansion beyond just the physical. However, when one dimension is separated from the others it loses the power that comes with the integration with the whole being. When each dimension is treated as a distinct entity rather than an integrated whole, it's difficult to see how wellness behaviors impact the whole person.



**Figure 13.** Who do you see in this illustration? A young woman or an old woman?

## Behaviors Affect All Dimensions of You

**Table 1** associates specific behaviors to a dimension of wellness. For example, it lists eating well in the physical dimension of wellness and self-esteem in the emotional dimension. In traditional wellness textbooks, the nutrition chapter was devoted to the chemical composition of food (physical dimension) and discussions of self-esteem were about feelings (emotional dimension). The unintended result separates mind, body, and emotions rather than integrating the whole being.

**Table 1: Old categories of dimensions of wellness.**

Physical	Emotional	Intellectual	Interpersonal	Spiritual	Environmental
Get physical activity and exercise	Believe in yourself	Be open to new ideas	Communicate well	Be loving	Reduce pollution and waste
Enjoy a good diet	Be confident	Ask questions	Be intimate	Be compassionate	Recycle
Know symptoms of disease	Understand and accept your feelings	Think critically	Establish and maintain satisfying relationships	Be empathetic and altruistic	Maintain sustainable development
Get annual medical evaluations	Be accepting of yourself	Be curious	Build a support system of friends and family	Be joyful	Promote clean natural resources
Practice safe sex	Trust yourself and others	Be creative		Find fulfillment	
Avoid injury	Share feelings with others	Enjoy a sense of humor		Be caring	
Avoid destructive habits	Be optimistic	Drive to learn new skills		Look for meaning and purpose	
		Learn throughout life		Belong to something greater than oneself	

In the integrated wellness paradigm, the whole you engages all dimensions with everything you do. Every healthy behavior impacts the whole you, not just part of you.

This book discusses how all dimensions of you are integrated in a way that affects your overall well-being. In addition to nutrition, for example, we explore emotional eating, how negative stress affects digestion, the effect of the environment on nutrition, and the benefits of eating together as a family.

The material on self-esteem includes attitudes toward your body, motivation and validation, and relationships with others, in addition to feelings. The dimensions of wellness blend together. Every wellness activity involves all your dimensions and all dimensions of you are involved in each wellness activity. It wouldn't make much sense if when you went for a walk or a run only your body went and your mind stayed home!

## Power of the Integrated Wellness Approach

The integrative paradigm is a very powerful approach to wellness. The science we have presented is a fraction of the evidence available that we function as a whole, integrated individual. The parts or dimensions of our being do not function individually or separately from one another. They blend together as one whole. Knowing this makes a huge difference in how you approach wellness or living a healthy lifestyle.

This wellness paradigm says that your healthy daily activity not only strengthens your muscles and heart, but physical activity also strengthens your mind, slows aging, and helps you have more upbeat feelings, among many other things.

This awareness helps you realize how much of your health and well-being is in your hands. Psychologists call this an internal locus of control. Physical literacy is a relatively new term used to describe the movement competence and confidence of individuals in the development of the whole person. The development of the whole person is the theme of this course.



*Figure 14. These are the dimensions of you plus others that impact your wellness.*

## Your Personal Wellness Wheel

The wellness wheel, shown in *Figure 14*, depicts what wellness encompasses. The individual, you, is placed at the center of the wheel with all your dimensions—physical, emotional, mental, social, and spiritual—around it. Wellness is reflective of the quality of your life. The quality and meaning of your life is not superficial but comes from deep within you, honoring the dignity and value every human life deserves. Just as you are the center of your life, you are the center of the wellness of your life.

Putting yourself at the center of wellness is not self-centered. Just the opposite is the case. As you thrive, there is a natural tendency to reach out to others. You are an amazing composite of body, mind, and feelings.

## Make Your Own Music with Others

As you strive for a harmony of your whole being, the process is analogous to playing in an orchestra. To contribute to the orchestra, you must first desire to develop your own capacities. You must work diligently to master your instrument. You must develop an intellectual understanding of the music. You and the other members of the orchestra bring together individual talent and passion that enhance the performance. When all are contributing the best of his or her physical, mental, and emotional self, the music produced is inspiring and brings joy to everyone who hears it (*Figure 15*).

Using this analogy, think of your life in a similar way. In what ways would you benefit from achieving the best in yourself and collaborating with the people and community around you?

A harmony of being is not dependent on your capacity to perform. It is dependent on your choices and your attitudes. As you formulate healthy attitudes and choices, your behavior and your lifestyle reflect these and the performance, if you will, becomes the life you lead.



**Figure 15.** When everyone contributes their best self, the music produced is inspiring.

## Your Lifestyle Choices

The spokes of the wellness wheel depict the behaviors that enable us to capitalize on healthy living for a more joyful and optimal life. In today's world, the quality of your life is, to a large extent, in your hands. For the most part, your lifestyle choices will determine the quality of your life and your longevity.

Wellness encompasses the life choices indicated in the spokes. These are generally applicable to most of our lives and have a bearing on living a healthy lifestyle. Included are

- Living a physically active lifestyle; specifically, maintaining cardiovascular fitness, flexibility, functional fitness, and muscular endurance and strength
- Consuming proper nutrition and maintaining a healthy weight
- Enjoying leisure activities and having fun and happiness
- Learning and cultivating intellectual curiosity
- Finding fulfilling work
- Serving others
- Having a meaningful life purpose
- Establishing healthy relationships
- Living in a healthy environment

The specifics of why and how each of these areas contributes to wellness are dealt with in depth throughout the book. Because wellness is a state of being, your wellness is personal to you. The healthy behaviors identified here are basic to wellness. You may have others that are important to your life or you may want to personalize those identified.

## Build Wellness into Your Life

Wellness is a rather simple and straightforward concept, but it is a challenging one to conceptualize and keep in perspective. With a good understanding of wellness, actually living a healthy lifestyle should not be too difficult. Those of you reading this book probably run the whole gamut from some who make very healthy choices to others who are struggling with addictive behaviors. Building wellness into your life is a highly individual process.

However, a common denominator is that the foundation for this process of living a healthy lifestyle is to deepen your understanding of who you are, the intent of this chapter. One study of nearly 10,000 adults showed that happiness and life satisfaction correlated to good, very good, and excellent health and the absence of long-term limiting health concerns. A better understanding of wellness and an appreciation of who you are basically translate into a greater commitment to wellness.

## FACTORS THAT AFFECT WELLNESS

Factors that affect wellness are a combination of personal lifestyle behaviors and beliefs, genetics, and social, economic, and political forces. Wellness is a matter of great concern to individuals but it is also a great concern to policymakers because the health or disease of the population has far-reaching economic costs and social implications.

A number of longitudinal studies have shown that these five factors are common to well-being:

- Not using tobacco
- Not consuming alcohol excessively
- Avoiding becoming overweight
- Reaching high educational level
- Having stable relationships

Of course, there are additional factors, but these five emerge through various population studies. Wholeness implies a balance of mind and body and the concept that the whole is greater than the sum of the parts. This is the main goal of integrated wellness. A healthy mind with healthy attitudes fosters a healthy body. A healthy body enhances the acquisition of a healthy mind and healthy attitudes.

Healthy people tend to have a healthy understanding of self, one that integrates the body and the mind and views the body positively. Positive attitudes toward the body are related to healthier behaviors.

## Environment

Creating health-supporting environments is a challenge on personal, community, national, and global levels, especially now with COVID-19, also known as COVID or the coronavirus. Highly contagious, COVID is caused by SARS-CoV-2, severe acute respiratory syndrome coronavirus. About one-third of those with COVID do not develop symptoms and about 14% develop serious symptoms similar to pneumonia. The elderly are particularly vulnerable to this virus. Variants have developed worldwide that for the most part are able to be curtailed with the available vaccines. By June 2022 1,008,196 had died from COVID in the U.S.

A problem going back much further, there are still hundreds of millions of people in the world without access to clean water and basic sanitation. Childbirth often occurs in inadequate conditions, resulting in high rates of child mortality, the death of children under five years of age. The World Health Organization is making effective strides in reducing these numbers, yet millions of people continue to cope with inadequate food supplies and poor housing conditions and lack access to parks, playgrounds, and other recreation facilities.

Pollution is another ongoing global concern that causes harm or discomfort to the ecosystem. Blacksmith Institute, a non-profit organization formed in 1999 to combat life-threatening pollution, publishes an annual list of the world's worst polluted places and the top toxic threats. Lead, mercury, chromium, arsenic, pesticides, and radionuclides cause risk for more than 100 million people, making these toxins a public health issue on par with malaria and HIV/AIDS.

Air quality is a major health concern both outdoors and indoors. Air Quality Index (AQI) or Air Pollution Index (API) reports are given in local areas to warn people when not to exercise outdoors or when to carpool. Secondhand smoke (environmental tobacco smoke) is associated with diseases in adults who do not smoke and the premature death of children.

While many aspects of our environment are beyond our personal control, many are within our span of personal choice. Access to parks, playgrounds, or other recreational facilities may dictate your choice of location in addition to access to quality education. A commitment to keeping your living space clean and safe will contribute to your own quality of life and that of the others around you, and can even help you be better prepared for emergencies.

Enjoying your job and your work environment may also greatly add to the quality of your life as you will probably spend a good portion of your time at work. Taking stock of your natural talents and your personal preferences may help you identify a career you will truly enjoy that will not place inordinate stress on you or influence you to live a sedentary lifestyle. Living within your means so that you are financially stable will also go a long way to contribute to your wellness.

# Genetics

In 2003, the Human Genome Project (HGP) completed a map of the human genome, which identifies all the genes in the human body. When it was finished, scientists were surprised to find that the human genome contains only approximately 25,000 genes, which is 10,000 genes more than a chicken but 5,000 less genes than a grape. The HGP basically put an end to genetic determinism, the belief that genes determine human traits and behaviors. Scientists realized from finding this simple blueprint that there is much more to understanding the complexity of human life than identifying genes (*Figure 16*).



**Figure 16.** The Human Genome Project put an end to the belief that genes determine human traits and behaviors.

## Epigenome

The science of epigenetics, control over genes or genetics, is an emerging field that studies the features of the cell that stimulate the DNA to be suppressed or expressed. These cellular activities compose the **epigenome**. DNA is not self-emergent. In other words, it cannot act for itself; it must be acted upon.

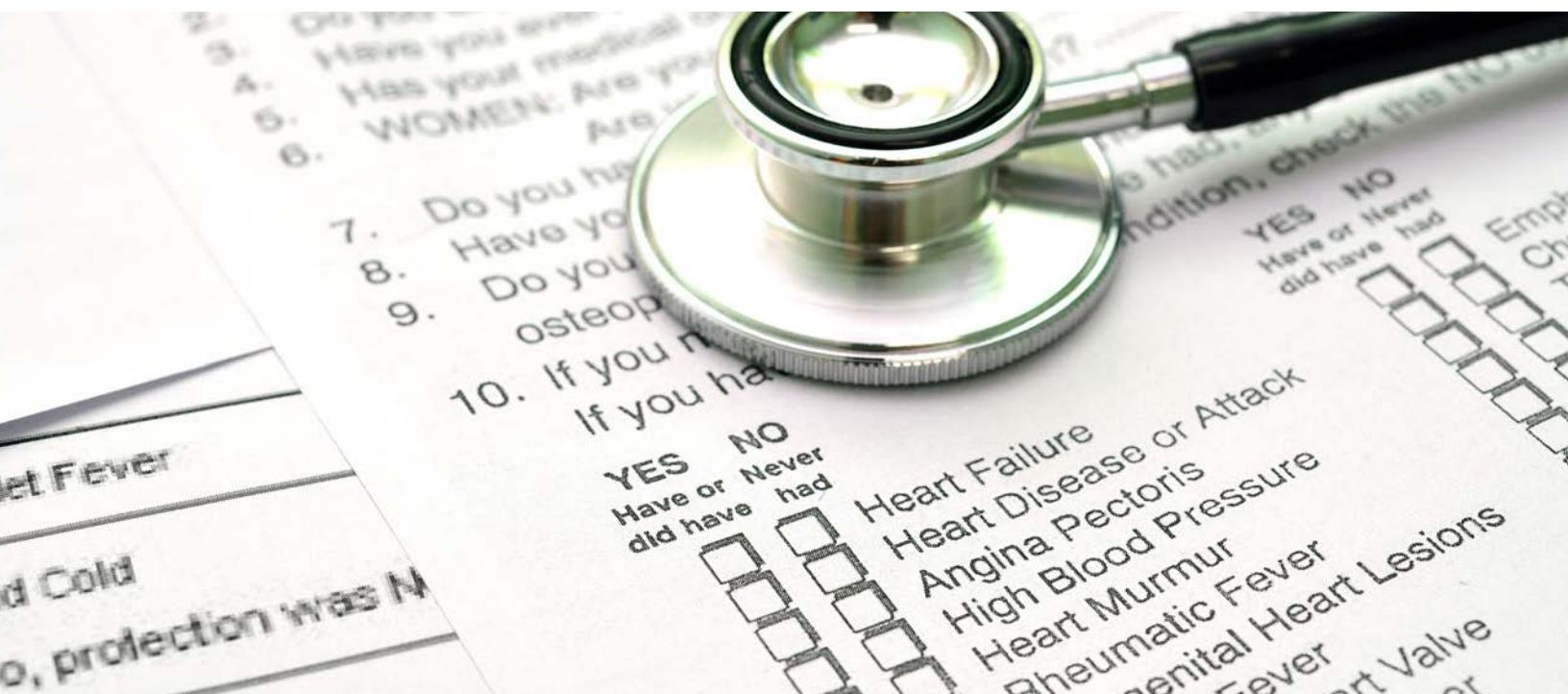
Gene modification is affected by lifestyle factors such as what we eat or drink, how we feel, and whether we are physically active. In a study using pregnant mice with the agouti gene (which makes mice extremely obese and gives them a yellow coat), the mice given methyl-group-rich supplements, like those available in health food stores, produced lean offspring with a brown coat. The pregnant mice with the agouti gene that were not given the dietary supplement produced obese offspring with yellow coats. The offspring are genetically identical but look entirely different. The obese mice were also diabetic while the lean brown mice were healthy. The dietary supplement modified the genes without altering the DNA.

Similar findings have been reported in human subjects. A study of monozygotic human twins, who had identical DNA and similar epigenomes at birth, found that the twins' epigenomes were remarkably different from each other in later years. Through the years, the twins chose many different lifestyle behaviors, such as smoking and non-smoking.

## Family Health History

A family history of a disease does not mean that an individual is going to contract that disease, but knowing your family's health history is important (*Figure 17*). Being aware of a high incidence of chronic disease in your family can alert you to genetic risks. It can also raise your awareness of how lifestyle, especially diet and physical activity, can raise or lower risk in your family. You get your attitudes, perceptions, and behaviors from the people around you, starting with your family.

Of the chronic diseases that are today's biggest health challenges, approximately 70–90 percent are most likely due to lifestyle and only a small percentage due to heredity. Genome-wide association studies (GWAS) have linked particular genes with particular diseases. A well-known example is the BRCA1 and BRCA2 breast cancer genes. What may not be as well known is that only 5–10 percent of breast cancers are hereditary.



**Figure 17.** Knowing your family's health history is important to managing your health.

## Exposome

The “nature vs. nurture” or “gene vs. environment” debate carries on with two disparate sides. Many experts are calling for an exposome to be developed. An **exposome** measures all the exposures to a person during a lifetime and how those exposures relate to personal health, such as risk of disease. The exposome maps the impact of exposures from the environment, diet, lifestyle, occupations, and other sources that impact health.

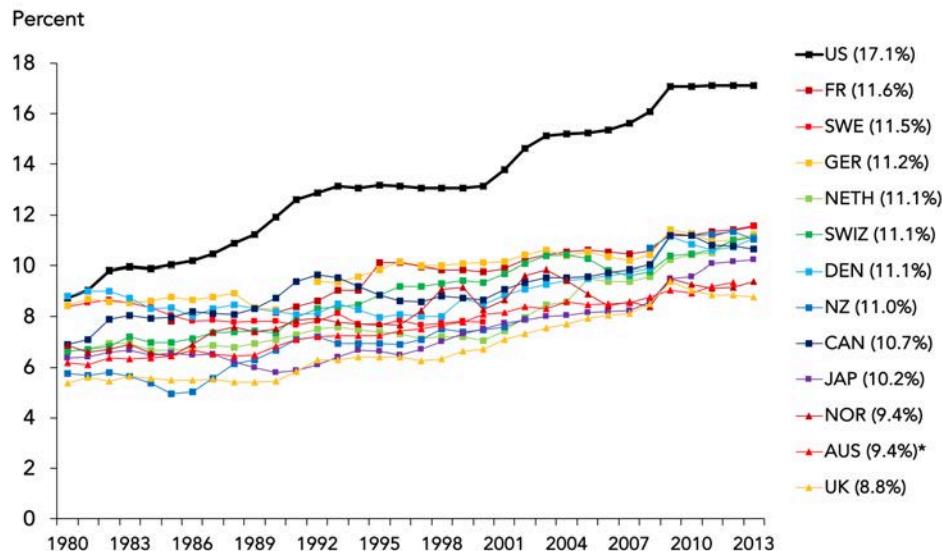
Genome information comes from sophisticated and well-funded science but environmental and lifestyle information often comes from questionnaires. Some experts are calling for scientists to adopt the concept of the exposome to make available the environmental equivalent of GWAS.

The sophistication level of the science used in the formulation of the exposome would need to match that of the science behind the genome. Without the information from the exposome, too much reliance is placed on the information from GWAS when it comes to disease prevalence. A more comprehensive view of environmental exposure is needed if epidemiologists are to discover the major causes of chronic diseases. Having both the genome and the exposome could also be very instrumental in helping individuals make wise choices regarding their own health.

# Access to Health Care

Access to health care is a major concern in most countries today, especially in the United States. **Figure 18** shows health care spending in 14 countries as a percentage of gross domestic product (GDP) 1980–2013. As you can see, spending on health care is not only significantly higher in the United States, but the costs have increased at a much faster rate than other countries.

Health Care Spending as a Percentage of GDP, 1980–2013



**Figure 18.** U.S. health care costs are significantly higher than in other countries. The high cost of health care in the United States is caused by a system that is designed to treat disease, rather than prevent it. **Notes:** Dutch and Swiss data are for current spending only, and exclude spending on capital formation of health care providers.

## A Right or a Privilege?

A major issue is the question as to whether health care is a right or a privilege. When health care is a right, the usual solution is a government-funded universal health care system, one giving access to health care to every citizen in the country. Sweden has long been known for its universal care system. Because of the rise in health care costs in the 1990s, more of Sweden's health care has been privatized so that by 2008 about 18 percent was back in the private sector. The same trend is occurring in Germany, England, and Canada. In addition to cost, other issues with the universal system are lack of specialized care and inability to receive timely treatment. The US Government Accountability Office (GAO) predicts that federal spending on major health care programs will increase from 5.9% GDP in 2020 to 8% GDP in 2050.

## Disease Care Versus Preventive Care

Another major concern is the disease care model that prevails in the United States. The current health care system in America is basically a disease care system, which means that the system is set up to heal people who are already sick or injured. Ninety-five cents of every dollar is spent to treat disease after it has occurred rather than trying to prevent the disease from occurring.

Leading doctors in mindbody medicine say that we are providing surgery that is dangerous, and ineffective and doesn't help people make lifestyle changes. For instance, life is not prolonged nor heart attacks prevented in 95 percent of people who receive angioplasties and stents. The INTERHEART study conducted on six continents (52 countries) with 30,000 subjects indicated that approximately 90 percent of heart disease could be prevented if a person lives a healthy lifestyle.

## Preventive Medicine

Healthy lifestyle changes are a central component of **preventive medicine**, which endeavors to apply treatments that prevent disease and illness. It is important to have access to medical, dental, and mental health care.

Health care benefits have considerable monetary value and may be as important as the actual salary you earn. When seeking full-time employment, these are important considerations. When on campus, if necessary, take advantage of the Student Health Services provided by the college or university. If you are still under your parents' health plan, determine if you can receive additional medical help in the area in which you are living. Finally, it is important for you to have a record of your own medical history and not rely on someone else for this knowledge.

## Social Determinants of Health

The World Health Organization describes the social determinants of health as the "circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics." These factors, along with individual lifestyle, work together to affect wellness. Some factors identified as playing a role in health care include income and social status, social support networks, education and health literacy, gender, and culture. The WHO established a commission on social determinants of health in 2005 to spearhead a global movement to overcome some of the more difficult health challenges. An awareness of global issues and a desire to share resources and talents will be the only way to achieve health equity.

## Lifestyle

Living a healthy lifestyle is what wellness is all about. Your lifestyle—your attitudes, perceptions, and behaviors—are the greatest determinants of whether you will achieve a healthy, fulfilling life. When you think of well-being as your own health status, a state of being, it will be your choices that decide if you enjoy well-being and at what level. A person may be challenged with a physical disability or financial challenges, but he or she can still achieve a high level of well-being. Someone else may be financially wealthy or athletically gifted, but also emotionally miserable and addicted to drugs or alcohol.

Wellness is not the innate capacity or talent you have. It is what you believe and what you do. Everyone can enjoy this state of being if they desire it, and if there is a willingness to work for it. It will not just happen; it does take effort.

## Make a Choice

An interesting thing about choice is that everyone has it. How you choose to live your life is up to you. Sometimes it may be tempting to blame others when things don't go right. If you step back and analyze what you are doing when you blame, you are saying that you don't have a choice: The other person or circumstance created your problem; you have forfeited your right to choose. The truth is that the choice is still yours.

## Take Action

There are many wonderful, healthy, lifestyle choices you can enjoy and this entire course is devoted to helping you build those into your life. One of the real keys is to enjoy your life your own way. This process of living well should not be drudgery. Well-being, by its very nature, is positive and optimistic. As you consider your current well-being status, what choices contribute to your happiness and well-being?

For some, it might be walking to class or work, drinking more water and less soda, getting adequate sleep, not using tobacco, and not drinking alcohol or drinking only moderately. For others, it might be getting a good workout with weights several times a week. Whatever leads you to happiness, it is always a good time to add to your sports skills repertoire to include individual sports such as golf or tennis or yoga or tai chi (*Figure 19*).



**Figure 19.** Sports are a great way to improve your happiness and well-being.

## Keep It Real

Simplifying life, trying not to cram so much in a day, may help you to enjoy a deeper feeling of well-being. Maintaining a healthy weight, establishing healthy relationships, and finding ways to enjoy wholesome recreation or satisfying leisure activities can add much-needed balance to life and help reduce the negative effects of stress. Thinking positively about yourself and others and reducing negativity in your life will work like a magnet helping to attract more positive people and things into your life.

## Emotional States and Attitudes Toward the Body

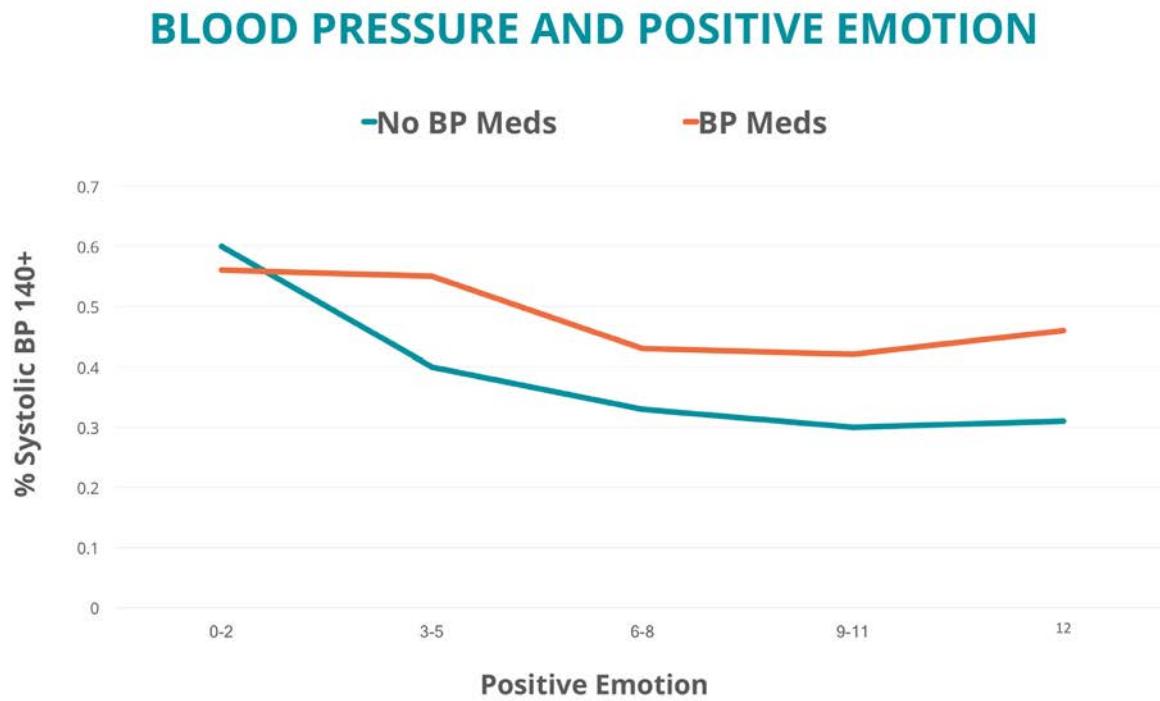
Taking a mindbody or integrated approach to fitness and wellness, it is imperative that we consider the relationship between thoughts, emotions, and physical illness. “There is no health without mental health,” says the World Health Organization. “Mental health can be conceptualized as a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community. In this positive sense, mental health is the foundation for well-being and effective functioning for an individual and for a community.”

## Links Between Emotional States and Physical Illness

A strong link between depression and coronary heart disease has been verified through research. Chronic stress, which is experienced on a daily basis, is also associated with the disease. Social stressors—such as divorce, the death of a loved one, or a life-threatening illness—tend to trigger depression. These life stressors also can worsen depression or bring about a relapse in those who have recovered from depression. Stress, possibly from dealing with the disease and its treatments, may cause a replication of the HIV virus in those people with HIV/AIDS and therefore play a role in the progression of this disease. Elevated levels of C-reactive protein, a known factor in cardiovascular disease, have been measured in adults who came from low socioeconomic status and a harsh family environment as children, indicating their susceptibility to heart problems.

## Positive Emotion and Wellness

The relationship between positive emotions and wellness has also been the subject of research. Many researchers have found a significant correlation between people who are cheerful, energetic, and display positive moods and physical health; more specifically, they have lower morbidity, decreased symptoms, and decreased pain. These positive traits are also associated with longevity in the elderly who live in communities. A study of 2,564 Mexican American adults, for example, found that people who expressed positive emotions also had lower blood pressure (*Figure 20*).



**Figure 20.** Percentage of older Mexican Americans with high systolic blood pressure by positive emotion score stratified by use of anti-hypertensive medication ( $p=.0001$  no meds;  $p= .09$  meds). Source: Ostir et. al. 2006.

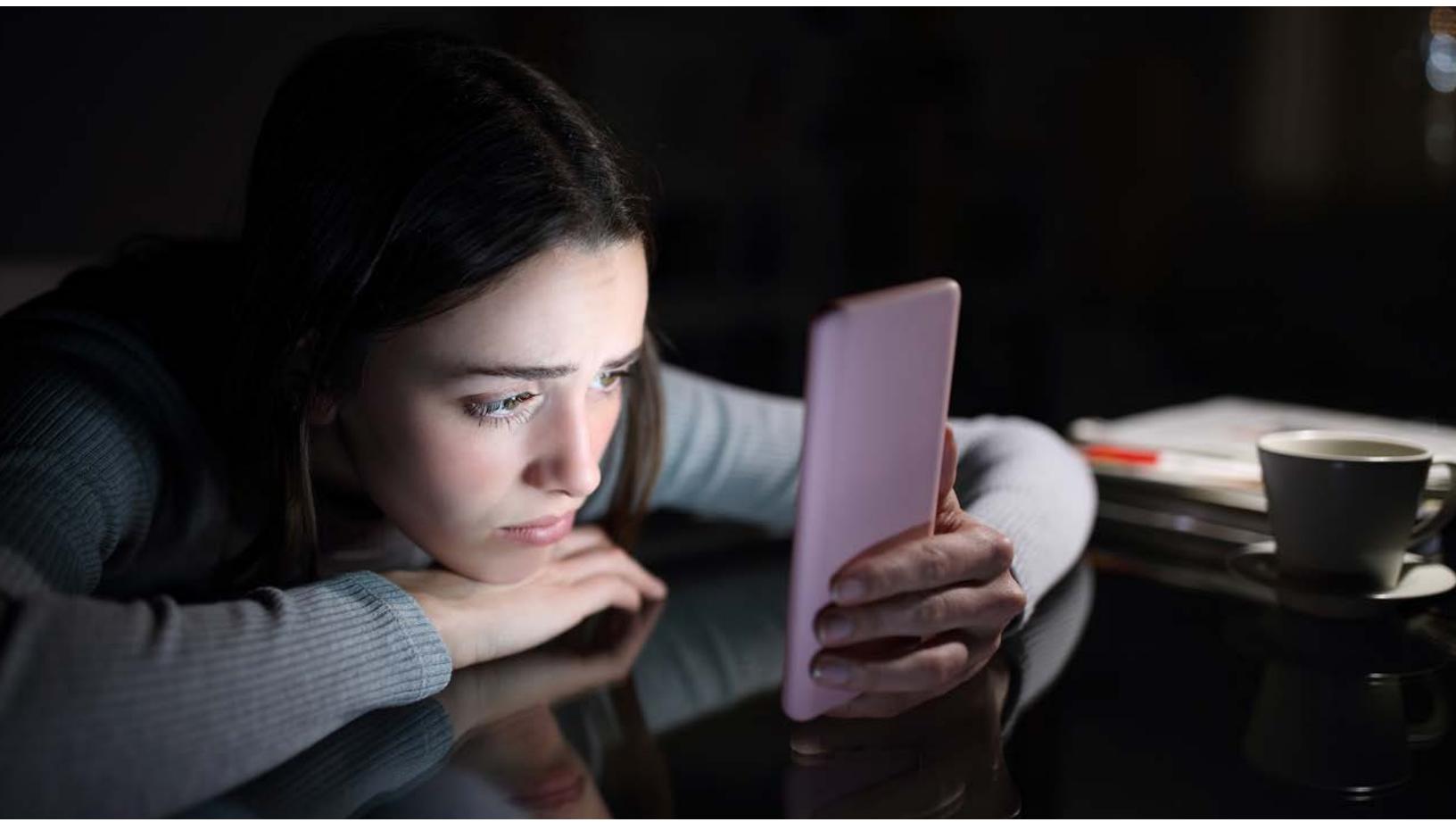
As we learned earlier about psychoneuroimmunology, our thoughts and feelings really do affect the biochemical actions of our bodies. Science is making it so clear that the body and mind do not function in isolation of each other. A sound understanding of the interrelatedness of mind and body and an appreciation of both are the best motivators for choosing to live a healthy lifestyle and therefore enjoy wellness. Negative attitudes about ourselves and our bodies, which we internalize from history and popular culture, can make it difficult to choose healthy behaviors.

## Body Objectification and Wellness

Body objectification and body shame are linked with disordered eating. Objectifying the body means that you perceive the body as an object, as a thing. Perceiving the body in a subjective way means that you identify the body as part of yourself. Objectification of the body is usually associated with perceiving yourself as you think others see you.

If a person buys into the belief that women's bodies should be thin to be beautiful, that individual may see her own body as not fitting the cultural standard. Her body becomes more an object that she wants to fit a cultural norm rather than being part of her. Objectification can lead to feelings of shame about the body and other negative emotions. Shame is a terribly negative emotion that is debilitating. Body shame can lead to revulsion or complete abhorrence of one's body. Self-criticism of one's whole body or specific body parts can become so extreme that it leads to body dysmorphic disorder (BDD). This disorder is significantly linked to depression and unhealthy behaviors.

Social media is powerful and can influence us in a positive or negative manner. Comparing oneself to "perfect images" projected in various forms of media can lead to body dissatisfaction and rejection (*Figure 21*). Trying to attain the looks of someone else can become addictive and lead to bodily harm.



**Figure 21.** Objectification of the body is often associated with perceiving yourself as you think others see you.

Living a healthy life is about much more than learning some positive health habits. Unless we are strongly motivated to adopt positive health habits, chances are we will not do them regularly even when we know they are good for us. The real motive for living a healthy life must come from deep within you. In large part, that desire stems from a recognition and acceptance of who you are. Your healthy living will be enhanced as you establish a healthy understanding of self. A healthy life then becomes an expression of how you feel about your body and your mind and the joy you experience feeling their dynamic unity.

# Healthy People 2030

Your individual health and wellness is your responsibility. Your health contributes to the health of society. Governments are concerned with individuals but particularly with the welfare of the society. Countries throughout the world have health standards that are usually found in some kind of program. In the United States, those health standards can be found in the Healthy People program.

Every decade since the 1980s, the U.S. Department of Health and Human Services (HHS) has published science-based 10-year goals perceived as realistic for attaining a healthy society. These goals are a comprehensive health promotion and disease prevention program for the entire nation. The intent is to provide guidelines for improving the health of all Americans and challenge communities to support health-promoting policies. The desire for a healthier culture must include all citizens regardless of race, sex, or income.



## Healthy People 2030 goals are to:

1. Attain healthy, thriving lives and well-being free of preventable disease, disability, injury, and premature death.
2. Eliminate disparities, achieve healthy equity, and attain the health and well-being of all.
3. Create social, physical, and economic environments that promote attaining the full potential for health and well-being for all (*Figure 22*).
4. Promote healthy development, healthy behaviors, and well-being across all life stages.
5. Engage leadership, key constituents, and the public across multiple sectors to take action and design policies that improve the health and well-being of all.



**Figure 22.** With the help of friends and family, the happiness of your mind and body is in your hands.

# MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Awareness of specific ways in which your mind and body interact and impact one another. Can you articulate several examples?
2. Recognize that all the dimensions of humans contribute to wellness and that wellness activities involve all the dimensions of humans. For instance, when exercising, you are involving all your dimensions and not just the physical or the body as was previously supposed. Think of an example of this reality.
3. Formulate your understanding of the nature of human life and particularly your life. Would your reality be "I am my mind" or "I am my body" or "I am my mindbody"?
4. Have familiarity with healing methods that involve the interaction of mind and body. Can you articulate several examples? Any of which you have had personal experience?
5. Explain to someone what constitutes wellness. In addition, what does it mean for you personally to live a healthy lifestyle and enjoy a high measure of integrated wellness?

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## GLOSSARY TERMS

**Active aging:** A process that enables people to maximize opportunities for health, participation, and security so that they can maintain quality of life as they age.

**Brain-derived neurotrophic factor (BDNF):** A human protein that promotes growth of neurons and synapses in the brain.

**Cartesian dualism:** The mind and body are two incompatible entities causing one to be antagonistic to the other.

**Chronic disease:** Human health condition or disease that has long-lasting effects and for which there may not be a cure.

**Enteric nervous system (ENS):** The system of nerves and neurotransmitters in the gastro-intestinal system; the "brain in the belly," controls digestion and plays a role in our emotional or mental state.

**Epigenome:** Cellular changes that result due to influences other than genes that occur while the DNA of the cell remains unchanged.

**Exposome:** A measure of all the exposures to a person during a lifetime and how those exposures relate to personal health, such as risk to disease.

**Immaterialism:** The belief that ultimate reality is something that has no material properties. This reduces matter to that which is not real.

**Materialism:** The belief that ultimate reality is something that has material properties and that which is immaterial does not exist.

**Neuroplasticity:** The ability of the brain to change neural connections and reorganize neural pathways. This can occur at any age.

**Neurotransmitters:** Chemicals that facilitate communication from one nerve cell (neuron) to another across a synapse.

**Paradigm:** A model or pattern that affects how a person views reality. A paradigm shift is a conscious effort to see things in a new way.

**Preventive medicine:** Medical treatments that seek to prevent disease and illness rather than finding cures for people who are already sick.

**Psychoneuroimmunology (PNI):** The research arm that supports behavioral medicine and investigates the manner in which thoughts and feelings affect the immune system and cause increased or decreased susceptibility to disease.

**Telomerase:** An enzyme that repairs damage to the chromosome.

**Telomeres:** DNA protein complexes that help stabilize a cell's chromosomes.

**Traditional Chinese medicine (TCM):** A number of medical methods that work to rid a person of disharmony and restore harmony and thus health and healing.

**Wellness:** A state of being that maximizes your quality of life and contributes as much as possible to the well-being of the community around you.

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Motivation for Making Healthy Change

# **WHY DO I FEEL THIS WAY?**

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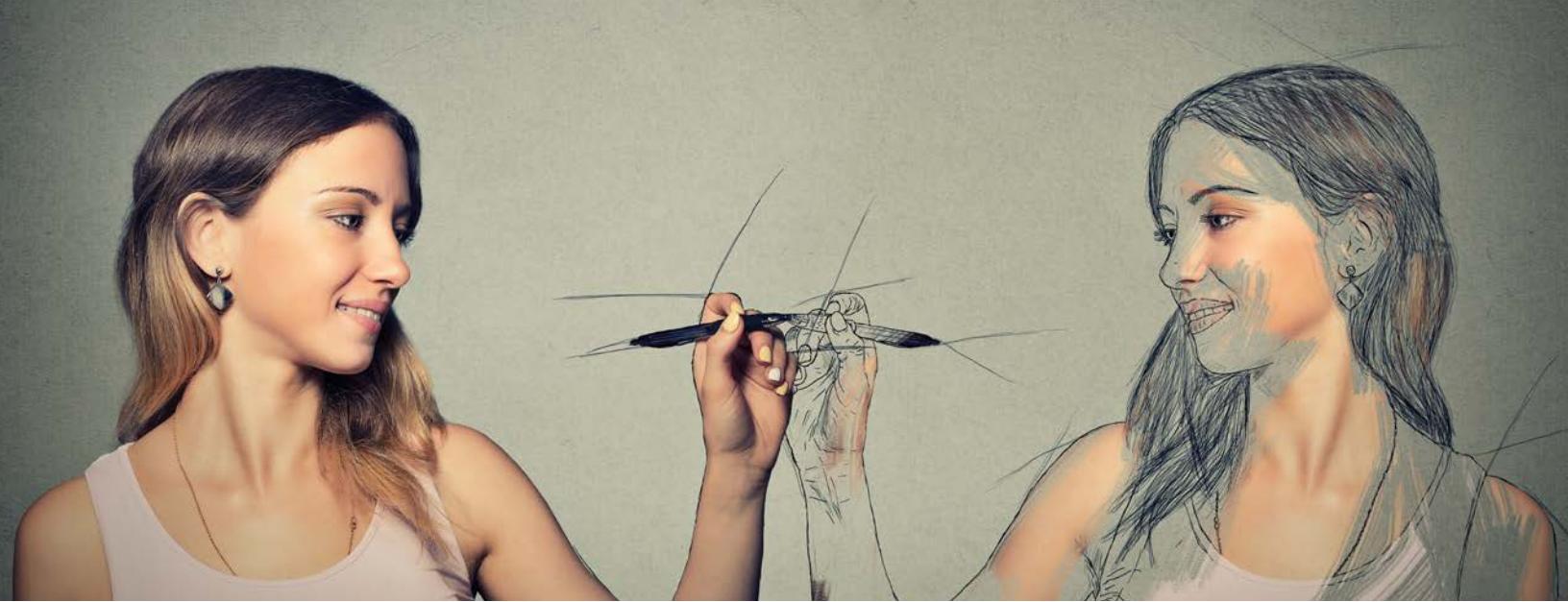
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Attitudes and behaviors go hand in hand. Awareness of the sources of your feelings about yourself and your motivations and strategies for change are the main thrusts of this chapter. As it is only recently that science has discovered details about what a tremendous impact our feelings and thoughts have on our bodies, maybe we thought healthy living was mostly about our body and taking care of our body. Now we know that the mind and feelings play a vital role in our health and well-being.



## After reading this chapter, you will be able to:

- › **DISTINGUISH** the difference between self-acceptance self-esteem, and achievement self-esteem.
- › **IDENTIFY** the elements of the Transtheoretical Model of Behavior Change and the Self-Determination Theory of Change.
- › **DESCRIBE** the four types of barriers to behavior change and identify strategies for overcoming them.
- › **USE** behavior change theory and goal setting techniques to create a personal development plan.



*Figure 1. How do you see yourself? A healthy self-perception is important to your health.*

# WHY DO I FEEL THIS WAY?

## motivation for making healthy change

### SELF-PERCEPTION

What shapes your view of yourself? Possible sources for the attitudes you hold include your own personal history, your family, and cultural expectations about gender or about the body. Establishing a healthy lifestyle is about a lot more than just learning a few healthy habits. Honest and sincere introspection about how you think and feel is essential to your wellness (*Figure 1*). **If you do not care for yourself, what will motivate you to take care of yourself?**

With a sound understanding of the composite nature of the self—mind and body—you are in a good position to consider the motivation for your attitudes and behaviors. What prompts someone to live a healthy lifestyle? In the chapter “Establishing a Healthy Concept of Self,” we introduced the science of the integrated functioning of the mind and body, and the impact that thoughts and feelings have on health and well-being. This science supports an important fact: **A strong sense of self enhances the integration of mind and body, but a negative self-image can actually disrupt mindbody interdependence.**

This chapter is devoted to analyzing why people think or feel the way they do and explains how you can make any needed changes to enable yourself to enjoy a healthy lifestyle. Change is a process and not a single event. Changes will occur in your mind and your body as you adopt new healthy behaviors. This is a complex matter that will not happen overnight. It takes time and energy to put off the old and put on the new. Adjustments need to be made all the way to the cellular level of the integration of your mind and your body. Sometimes you may feel that you are taking three steps forward and one step back. Not every day is going to go perfectly. Be patient and have an attitude of give and take. If you are not flexible, a bad day in which you do not fulfill your expectations may discourage you to the point of giving up on making a change. Also, if you think of change as an event, you may expect to make a change in one quick attempt. Rarely does change ever happen that way, especially lasting change. Give yourself a chance to let it unfold.

# Wellness Demands That You Be Proactive

Being proactive and tackling problems is an exciting way to overcome barriers to behavior change. Living a healthy lifestyle is something you have to pursue because it is not just going to drop in your lap. The real challenge is to live a healthy lifestyle right now and throughout your entire life. The best way to start is to understand who you are and, very importantly, how you feel about yourself. It is our intent to help you establish lasting feelings of self-acceptance and self-respect. As the mind and body are designed to function as one dynamic whole, pursuing respect for and harmony of self is a natural course of life to choose (*Figure 2*).

Your thoughts and feelings greatly affect your body, your health, and your well-being, especially your thoughts and feelings about yourself. What do you think about your body? Why? Are you influenced by friends, famous people, the media, or societal norms? What is it about yourself that you value most—a good body, good mind, personality, character, competencies, or talents?



*Figure 2. Self-discovery is an important skill from which you will benefit your whole life.*

## Decide That You Are Worth the Effort

Can you think of any rational reason why one person is of less or more value than another? Much of human suffering comes from people trying to establish superiority of one person or a population over others. Racism, sexism, ageism, despotism, and terrorism are all grounded in contempt. When these destructive ideologies are overcome, human beings flourish.

The same holds true for us on an individual basis. One of the greatest barriers to our own wellness is any form of contempt we might have for ourselves. Rid ourselves of the contempt that comes from negative **self-talk**, and we rid ourselves of one of our greatest foes. Eliminate negative self-talk and negative views about our bodies and we will be in a position to flourish.

What form might this negativity take? We can be critical of our whole body or individual parts. In the chapter “Establishing a Healthy Concept of Self,” we talked about body dysmorphic disorder (BDD). Such extreme rejection of the body is classified as a mental illness. Body dissatisfaction is certainly negative but usually is not to the extreme of being a mental illness. We are not meant to dislike who we are. It is not healthy for the

mind nor the body. We can hold ourselves back with negative self-talk. Negative self-talk and self-defeating thinking are quite commonplace when it comes to our bodies and holds us back from making positive changes. When we don't like and appreciate our bodies, it's impossible for a whole bodymind person to fully like who we are (*Figure 3*).



**Figure 3.** Don't let the inner voices ruin your life.

Where do we get these negative thoughts? Some might come from past history. Abuse of any form leaves terrible scars. Our own personal behavior may not have lived up to our standards and we let ourselves down. Other people might have had expectations for us that we did not meet. We may let perceptions become a reality in addition to experiences. Coming to college and finding so many other beautiful, handsome, bright, and talented people may influence us to think that we aren't good enough. Making comparisons with others is the slippery slope for negative self-perceptions.

The fact of the matter is that each person is of equal value or worth, mind and body, just as we are. It is behavior that distinguishes us. It is easy to confuse behavior with being. The human being is the mind and the body, not the behavior of the mind and the body. There is a distinction between the value of a human being and his or her behavior. As doctors are now teaching, people are not their illness. Labeling people by illness or behavior only exacerbates their problems. Every positive worldview that is free from contempt places value on each and every human being. In spite of the negativity of our day, we often experience that which verifies the individual value of each life.

While enduring the atrocities of the concentration camps in World War II, Viktor Frankl developed his school of psychotherapy, which he called logotherapy. He realized deep down that his life had meaning no matter how inhumanely he was being treated by his captors. After surviving the camps, Frankl taught that every life has meaning, and it is up to each person to discover and believe in that meaning.

THE SCIENCE OF THE WHOLE INDIVIDUAL

## Recognizing the Value of Life

Several rescue stories exemplify peoples' recognition of the value of each life. Jessica McClure, who was 18 months old, fell into a narrow well pipe in the backyard of her Texas home in 1987. For 58 hours, millions of people all over the country watched as her rescue was broadcast live on television. President Ronald Reagan, who was the US President at the time, said it was as if each American became Jessica's godfather or godmother. The private donations that poured in were enough to support Jessica for life. Today, the adult Jessica is married and lives a normal life.

In 2010, 33 miners were trapped in a collapsed mine near Copiapo, Chile for 69 days. Approximately twenty million dollars of private and government monies were spent in the rescue of these men. It was estimated that over one billion people witnessed the rescue on television or the Internet.

Through methods of healing or rescue or untold means, human beings go to extraordinary lengths to save the lives of others.



*Credits:* Hugo Infante/Government of Chile

# Build Self-Esteem

Self-esteem is the opinion we hold of the worth or value of our whole being, mind and body. The worth or value of life is already present in each person, an inherent quality of our being. It takes action on the part of each individual to recognize and embrace that inherent worth. This is why the way we feel about ourselves is called self-esteem, because it is a feeling we have generated.

The fact that self-esteem requires an action has led some to misconstrue the concept and assume that worth is somehow self-generated (*Figure 4*). Rather than self-esteem being our action to acknowledge value, self-esteem would be an action to create or earn individual worth. Thinking we must achieve or earn our worth establishes a worldview that would condone prejudices such as racism or sexism because the possibility of superiority or inferiority is built into this outlook. Value of life would then be contingent on something, a kind of commodity to be gained rather than an inherent quality of life.



**Figure 4.** It takes action to recognize your great worth.

The unusual but comforting dynamic of true, healthy self-esteem is that once you acknowledge and accept your inherent worth, self-esteem basically becomes a non-issue in your life. In other words, your worth is not something with which you concern yourself. It is there, you acknowledge it, and there is nothing more to fuss about. With the worth of each person being the same, there is nothing regarding worth to compare or contrast between individuals. The opposite is true if you think you must generate your own worth or value. Because it is something you feel you have to acquire or create, it can become a concern that usurps a great deal of thought and energy. This perspective could lead to the unnecessary struggles that come from doubting your worth. Feelings of worthlessness or any negativity about yourself are extremely unsettling. Feelings of superiority can make you a real challenge to be around.

Take a moment to complete the Worth Index assessment online. This is an assessment tool that measures if you perceive that your worth is innate or if you perceive the worth of a human life is something that must be gained or is based on some contingency.

Wellness is a state of being, so it is the potential of every person. A good sense of self or true self-esteem is likewise the potential of every person. These concepts go hand-in-hand, and the one is vital to the other. Wouldn't it be exciting at this point if each person reading this chapter decided that he or she is of great worth? That would mean we are all ready to move from intention to action in a very healthy way. After considering attitudes and motives pertinent to healthy living, now it is important to learn specific strategies to help us make desired changes in behavior.

## MOVING FROM INTENTION TO ACTION

Your actions are greatly affected by your view of yourself. If you personify self-acceptance self-esteem, this perspective enables you to approach behavior change in an emotionally healthy manner.

### Healthy Self-Acceptance Self-Esteem

With healthy ***self-acceptance self-esteem***, suppose you decide you want to add more physical activity to your daily life. You make smarter goals and begin quite sensibly. Then several changes take place that interrupt your physical activity for a few weeks. Rather than give up on yourself or think of yourself as a failure, you are able to objectively analyze what went wrong and overcome the momentary lapse. Your behavior in terms of keeping physically active was not what you had hoped, but you did not make the behavior detract from you and your good feelings about yourself. All those good feelings remained stable and you dealt intelligently with the failed behavior (*Figure 5*).



*Figure 5. Self-acceptance self-esteem allows you to deal with failure intelligently.*

# Unhealthy Achievement Self-Esteem

**Achievement self-esteem** (or contingent self-esteem) is based on the belief that you must do something to be of value. This kind of self-esteem can increase worry and anxiety while you are striving to attain significance. By taking this perspective of yourself, you do not recognize the value of your life that already exists. You think that you have to obtain worth or value by comparing yourself with others, to see if you measure up to what you see around you. This perspective makes it very difficult to approach behavior change in a healthy manner.

Let's consider the earlier example of wanting to add more physical activity to your daily life. However, this time when you do not succeed with the goals you set for yourself, you think of yourself as a failure. The negative thoughts you have about yourself may cause you to give up: Why bother to try because I can never do what I set out to do and it just makes me feel worse about myself? Making your value or worth and your behavior one and the same can be very self-defeating and detrimental to both your mind and your body.

## Intrinsic and Extrinsic Motivation

That which prompts us to action is generally classified as extrinsic or intrinsic motivation. **Intrinsic motivation** means that we initiate an action or behavior because we want to and because it is interesting or satisfying to us (*Figure 6*). **Extrinsic motivation** means that our behavior is controlled or motivated by others or by some external reward.



*Figure 6.* Extrinsic motivation is fueled by others or outside influences.

## Self-Esteem and Motivation

These types of motivation—*intrinsic* and *extrinsic*—align with the two perspectives on self-esteem. *Intrinsic* aligns with self-acceptance self-esteem. *Extrinsic* motivation aligns with achievement self-esteem. *Intrinsic* motivation serves to strengthen the individual and maintain the distinction between the individual and his or her behavior. *Extrinsic* motivation, for the most part, reinforces the need to attain some end that serves to project the individual as one and the same with his or her accomplishments or behavior.

The dynamics of dealing with behavior change are greatly affected by these perspectives. The more the behavior is associated with the person, a suggested change in behavior may be perceived as a rejection of the person. Keeping the person and behavior separate allows behavior change to be done in a far more objective manner.

## Intrinsic Motivation Results in Longer-Term Behavior Change

*Intrinsic* motivation for healthy living results in a healthy lifestyle whereas *extrinsic* motivation for healthy behaviors results in behaviors that are short-lived. Researchers have found that *extrinsic* motivation may rob a person of *intrinsic* motivation.

For example, when we are young, we participate in a sport or activity because we enjoy it; it's fun. We did not have to be told to do it. As we grow older, playing sports is rewarded with trophies, medals, or money. For some, the *intrinsic* motivation—the fun and joy—is replaced by the *extrinsic* motivation of winning the next award (*Figure 7*). They forget what it felt like to just play for fun.



*Figure 7.* Love is the greatest intrinsic motivator.

However, Edward L. Deci and Richard M. Ryan, professors in the Department of Clinical and Social Sciences in Psychology at the University of Rochester, found that when *extrinsic* motivation is internalized, it could be a positive motivator in addition to *intrinsic* motivation. For example, if a person exercises to get the reward of good health, and good health is a dominant value for that person, even though good health is *extrinsic* in nature, as the person internalizes this behavior, it is one that is chosen freely and not imposed on the individual. Of all the classifications of *extrinsic* motivation, this integrated one that complements *intrinsic* motivation can result in long-lasting positive behaviors.

In the chapter "Establishing a Healthy Concept of Self," we discuss behaviorism as it relates to materialism, the concept that a person is only their body. Operant conditioning is a form of behaviorism manifested by giving a stimulus and rewarding the correct response. Animal training uses this method of learning. Ryan has reported that in humans, it has proven to get desired results whether used by parents or teachers.

However, the cost of attaining these results is quite high in terms of personal interactions. Students or children who feel coerced or manipulated into behaving in a certain way can come to greatly resent the authority figure making the demands. The students may do exactly what is required but at the same time develop strong feelings of resentment toward the teacher. The same holds true for children's feelings toward their parents. Sports competition, by its very nature, requires that someone win and someone loses; this is extrinsic in nature, as are many other enjoyable activities. Awareness of extrinsic and intrinsic motivation is especially important as their dynamics may play a crucial role in personal development. We will discuss motivation in further depth as we look at models of behavior change.



*Figure 8. Healthy change takes one step at a time.*

## MODELS OF BEHAVIOR CHANGE

There are a number of models of behavior change that share a few basic characteristics:

- Introspection and reflection on what is important in life
- A view that change is a process and not a single event
- Step-by-step approaches to making lasting changes in behavior

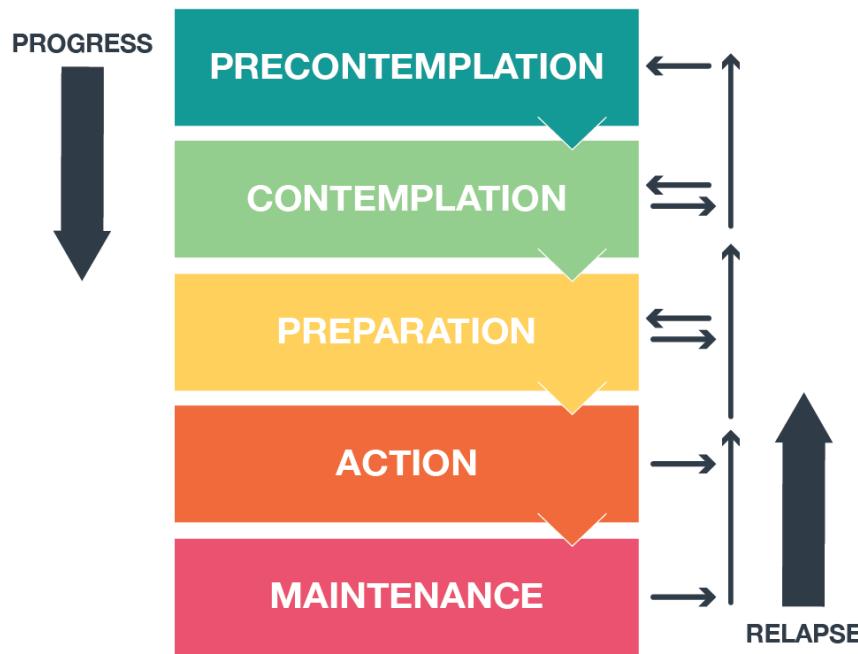
Reflection on the meaning and purpose of your life gives context for behavior change. The change concerns you and your life and needs to be what you want to do. In the long run, does the newly acquired behavior support your positive life purpose? Introspection requires that you ponder what is most important to you. Living for something about which you are passionate that puts you in a position to help better life for others

gives great meaning to your own life. Just as when you are really passionate about the career direction you are taking, you make sure you learn as much as you can in the courses that prepare you for this career. Giving yourself the time and opportunity to consider deeply what is most meaningful to you will give energy and drive to your behavior change and to your life.

One step at a time gets you to the top of the mountain. The complexity of real behavior change is as complex as the integrated functioning of the mind and body. The more you can realistically break down what it is going to take to reach your goal, the more effective your efforts will be. Write down the action you will take each day. This will deepen your resolve to take action. Each step can add to your confidence and ability to take the next one. In addition to the new behavior emerging, you may discover a whole new excitement about yourself in the process (*Figure 8*).

## Transtheoretical Model of Change

The stages of change model or transtheoretical model (TTM) was developed by James O. Prochaska, professor of clinical and health psychology and director of the Cancer Prevention Research Center at the University of Rhode Island, and Carlo C. DiClemente, a professor and chair of the Department of Psychology at the University of Maryland Baltimore County. The transtheoretical model of change was designed specifically to promote healthy behavior change. It describes the process of change as going through six stages for the purpose of modifying or eliminating unhealthy behaviors and adopting new, healthy behaviors (*Figure 9*).



*Figure 9. Stages of the transtheoretical model of behavior change.*

### Precontemplation Stage

In this stage, a person is not planning to make any particular changes within the next six months. Their inaction may be a result of lack of awareness of the consequences of their behavior or they may be demoralized because of past failures to change. At this point, they are not interested in getting help. They tend to defend their bad habits and not see them as problems. They may feel that others are pressuring them to change and resist those efforts. The goals for this stage are to begin thinking about change, recognize that there is a problem by becoming aware of warning signs, and talk about past experiences with trying to change.

## Contemplation Stage

A person in this stage intends to make a change in their behavior within the next six months. They believe that change is necessary but do not value the improved behavior enough to commit to making the change immediately. They express a desire to learn more that will help them to make a change and review what has helped them in the past. It is easy to get stuck contemplating change and never taking action to make the necessary change. (Reading the chapter is good, but doing the assessments is even better!) The goals for this stage are to examine the barriers to change, realize the reasons for not changing, and consider what specifically would keep them from changing at this time. They also might reflect on why they want to change and what would help them the most to make changes.

## Preparation Stage

In this stage, a person intends to take action to change their behavior within the next month. During the past year, they have already taken some significant action and have developed a plan of action. This plan may include taking a class, buying a self-help book, talking with a physician or personal trainer, or developing their own ideas for change. They are ready to become part of specific exercise programs, smoking cessation programs, or weight loss programs. They may make their intentions known to others to enlist needed support for making the change. (Are you finding family members, friends, or others to give you support? Are you taking an activity class?) The goals for this stage are to enroll in specific programs and begin to make the desired changes. They need to realize that this is a lifetime change and not something temporary.

## Action Stage

A person in this stage has made changes in their behavior over the past six months. To overcome unhealthy behaviors, they are modifying their behavior or their environment. These changes are requiring a commitment of time and energy. They are also making observable changes that others will hopefully notice. Good behaviors are replacing harmful ones. (Have you considered the positives in your lifestyle? Celebrate your victories!) Goals in this stage are finding needed support to keep behavior change going and becoming comfortable with the new lifestyle behaviors that are being adopted.

## Maintenance Stage

In this stage, a person has continued their behavior changes for another six months. They continue to work so as not to relapse into former unhealthy behaviors. This stage is a continuation of the action stage with the intent for it to last a lifetime. Rather than just completing a program over a certain period of time, this stage is focused on creating a new permanent lifestyle. Goals for this stage are for the individual to identify with the new behavior as his or her own for the rest of their life and do what is possible to assist others in their quest for change.

## Termination Stage

At this point, the behavior that has been adopted is a sure thing and the person will never go back to their former behavior as a way of coping. There is no longer a temptation to behave in the unhealthy manner that they have left behind. The old behavior is terminated. The goal in this stage is to celebrate the accomplishment of having made the behavior change.

# The Core Constructs of the Transtheoretical Model

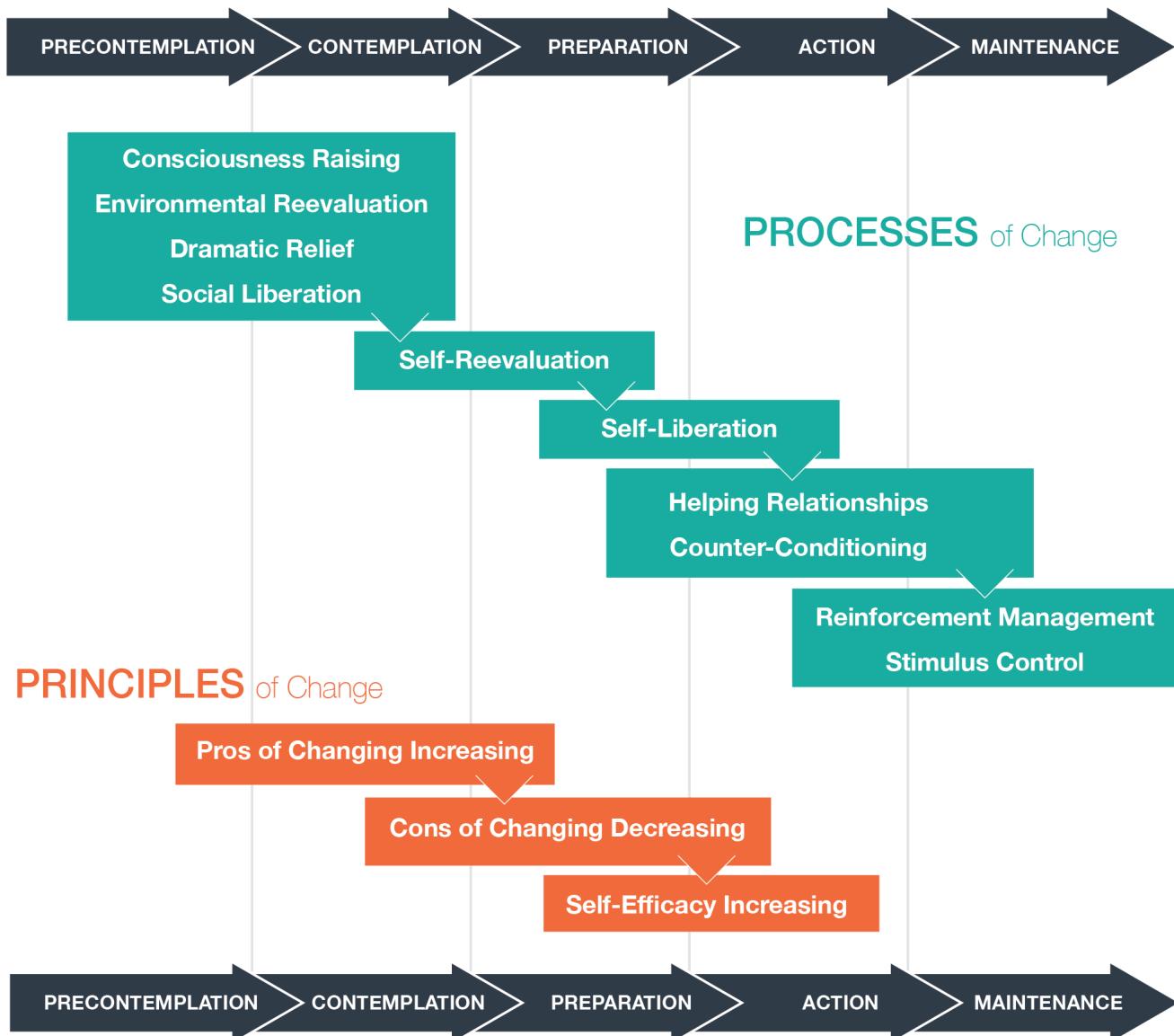
There are five core constructs in TTM:

- Stages of change
- Processes of change
- Decisional balance
- Self-efficacy
- Temptation

In addition to the stages of change presented previously, there are four additional constructs.

## Processes of Change

There are 10 processes or activities of change to help people progress through the stages of change (*Figure 10*). The first of these are behavioral, interpersonal, cognitive, and emotional techniques, as well as strategies that people, or those helping people to change, use in the process of moving away from problem behaviors. Specific processes are better suited for specific stages of change.



*Figure 10. Processes of change in the transtheoretical model.*

To move from precontemplation to contemplation, invoke the processes of consciousness raising, dramatic relief, and environmental reevaluation. Say you need to add more physical activity in your life. Why bother if no one else around you is active? Hopefully, the need is recognized without some traumatic event causing the change.

Between contemplation and preparation, the main process of change is self-reevaluation. Are you willing to invest enough in yourself to consider making the change? A healthy motive will lead to lasting change. Between preparation and action, focus on the process of self-liberation. Let yourself be rid of the behavior holding you back. Don't identify with past mistakes. Let the future be your reality. Between action and maintenance requires contingency management, helping relationships, counter-conditioning, and stimulus control. You can do this on your own, but it helps to have additional support.

Interventions must be matched to the person's stage of change. In the earlier stages a person must apply cognitive, affective, and evaluative processes. These are experiential processes to increase motivation. In the later stages commitments, conditioning, support, and environmental controls are more appropriate change processes. These are behavioral processes that help to maintain behavior changes.

## Decisional Balance

This is the time for the individual to weigh the advantages and disadvantages of changing. Specific pros and cons relate to the stages of change. Usually the disadvantages outweigh the advantages in the earlier stages with a shift to the advantages outweighing the disadvantages in the later stages. The degree of change in the pros and cons is also of interest. As a student you are likely considering the pros and cons of future careers. Give your own healthy living as much consideration as you give to making a living.

## Self-Efficacy

This construct is the confidence that people have that they can be in high-risk situations and not revert to unhealthy behaviors to cope. It is the confidence that people have that they can adopt a particular behavior. This confidence rises through the stages of change.

## Temptation

This construct reflects the degree to which the desires for unhealthy behaviors emerge in difficult situations. Temptations decrease through the stages of change.

The advantages of TTM are the perceptions of behavior change as a process rather than an event and provision of tools for research and intervention. In the stages of change, it is more common for people to return to a previous stage before moving on than to march linearly through the stages. It makes the process more a spiral than a straight path.

## Self-Determination Theory of Change

The self-determination theory (SDT) is a theory of motivation based on the belief that humans have natural, intrinsic tendencies to make healthy and effective choices. The focus is consistent with positive psychology, which develops strength in individuals. The SDT has identified three psychological needs of people across cultures that support growth, integrity, and wellness: autonomy, competence, and relatedness. These needs developed in supportive environments enhance the acquisition of long-term healthy behaviors.

## Autonomy

Motivation for healthy living develops from deep within us when we are able to act according to our own will. This is the psychological need for **autonomy**. The opposite of autonomy is control by others. Autonomy is parallel to self-acceptance self-esteem; you are choosing to believe in your own innate worth using your own volition. This is why self-acceptance self-esteem is so basic to healthy living. It satisfies one of our greatest psychological needs for positive mental health at the very foundation of our being, a good sense of self that comes from using our own free will (*Figure 11*).



**Figure 11.** Choose to believe in your own innate worth.

Control is the opposite of autonomy because you are giving your choice or will over to others, putting yourself in their control. With achievement self-esteem, you lay the groundwork for what Deci and Ryan call introjection. By making acceptance of yourself dependent on some condition, you are introducing the reality that someone else decides your worth for you. “I will like myself if I lose 10 pounds,” or “if this person is my friend,” or “if I make the team.” Introjection, one of the four types of extrinsic motivation, is behavior that is aimed at receiving praise from others, thus boosting the ego or an acceptance of self that is based on someone other than yourself. Without having the strength that comes from autonomy, we are left with a weak foundation, at best, upon which all other behaviors are built.

In terms of behavior change, for many people, the health behaviors of taking medications, quitting smoking, exercising, and eating healthy foods are not the behaviors that give them their greatest joy. How does this idea apply to you? If you desire to make lasting changes that result in living a healthy lifestyle, it is imperative that you choose to value healthy behaviors and recognize their importance to your life. Just believing they are good for you is not enough. Valuing them means they are so important to you that you will do something about them, so you can live them. This act of autonomy in which you freely choose these behaviors is called integration regulation, a good form of extrinsic motivation. These behaviors, integrated into your life along with your other values, complement your autonomy and support your need to be in charge of your own life.

As long as these behaviors are in the control of someone else, such as a teacher, coach, parent, doctor, personal trainer, or friend, and you are only doing them because of their influence, your behaviors will be short-lived. You may do them for a time to get the satisfaction of pleasing someone else or to avoid guilt or shame, but these will not be lasting behaviors in your life. Integrating them into your life by way of your own choice is the only way to make lasting changes. They must become something that you honestly want to do—and wouldn’t it be great if they eventually really do bring you great joy?

## Competence

Facilitated by autonomy is the psychological need for competence, the confidence and ability to make changes. This is the second basic psychological need for healthy motivation identified in SDT. By making your own choice to value healthy behaviors and integrate them into your life, now you are motivated to learn what you need to adopt these behaviors. Of your own volition, you are motivated to take a class, read a book, or enroll in a program. You want to seek out help and develop the skills and gain the knowledge you need to be successful (*Figure 12*).

Without autonomy, competence could be just another form of control in that you only engage in activities because someone else is demanding that of you. The actions could actually work against you if they breed resentment or resistance on your part. Autonomy and competence must go hand in hand. Competence gives you the skills and abilities to act on what you have freely chosen to do.



**Figure 12.** Make your own choice to value healthy behaviors.

## Relatedness

Next comes relatedness. No one is an island; life is to be shared with others. Healthy relationships are key to healthy living. Positive relationships affect our minds and our bodies, even supporting cellular health. When we, of our own free will, choose to be with another and support them, it benefits both individuals. Relatedness ties to autonomy and competence in that well-being will be enhanced for both individuals if they freely choose their relationship and if they have the skills to relate well.

In the process of behavior change to adopt healthy behaviors, it is imperative that your doctor or teacher or other health care provider is a person you can trust. If you do not feel genuinely respected and cared for by that individual, the internalization of the new healthy behaviors probably will not occur. You will be less likely to comply with their treatment recommendations. Connecting to others and to the environment is a major factor in behavior change. Positive relationships of trust, together with autonomy and competence, are all needed for effective behavior change.

# Applying Self-Determination and Transtheoretical Models

The self-determination model (SDT) can help us apply and benefit from the transtheoretical model (TTM) stages of change. In a number of studies that analyzed both models together, types of motivation from the SDT were aligned with the TTM's stages. People in the precontemplation stage exhibited amotivation, meaning no motivation or being without motivation. This is certainly consistent because in the precontemplation stage there is no readiness for change. Amotivation also means that the person is apathetic, uninterested, and is not engaged in self-determination. People may be at this stage of no change, as yet, for very good reasons. Being at this stage could reflect a feeling of learned helplessness, a condition that we will discuss in detail in a later chapter. Maybe the person sincerely tried to be more physically active, for example, but failed miserably. Maybe the lack of support from others or environmental factors worked against this individual. This highlights the reality that autonomy, competence, and relatedness can all be diminished in controlled environments. If you were in this situation, what would it take for you to get moving again?

In the contemplation stage, there is some amotivation, but the dominant motive for action is in the realm of controlling behavior. In this stage, someone contemplates healthy behaviors because other people were recommending them. They consider exercise because someone else told them that it was important for them, not because they want to exercise. Gaining more knowledge about how healthy living enhances both the mind and the body may be the very motivation someone needs to get going. If we have not personally experienced the benefits, reliance on others may be all there is to get us motivated.

Out of all the stages, a person in the preparation stage is more motivated by external incentives. Once they actually decide to make a behavior change, incentives to do so play an important part in the beginning. If the incentives are controlling and are used to elicit a behavior—for example, you will be paid \$25 to run every other day for two weeks—they tend to diminish the person's intrinsic desire to do the behavior. If the incentives are given as a reward spontaneously after the behavior—for example, you ran every other day for two weeks, so we are going to recognize your accomplishment by giving you \$25—they do not diminish the desire, the autonomy. Rewarding behavior must be done wisely or it will inevitably turn into a controllingtype action.

In the action stage, a person is beginning to be motivated by their own desire to be healthy. They start to recognize the benefits of their healthy behaviors and want to do them for the results they are getting. A shift away from external incentives to autonomy accompanies competence and relatedness. For instance, someone expresses that they want to exercise because of their own choice, because they feel capable and they like being with friends. This is particularly true of those who have good support of friends or family or are on a team or part of a club.

In the maintenance stage, there is more autonomy, competence, and relatedness expressed than in any other stage. Studies by Richard Ryan have indicated that these three psychological needs are correlated with continued long-term health behavior better than other forms of motivation. In this stage, a person is motivated by the enjoyment of what they were doing in addition to enjoying the results of their healthy choices. Some controlling motives are still evident but, for the most part, someone at this stage chooses healthy behaviors because they want to, not because they feel compelled to make those choices. Also, in these later stages, the person feels more energized and alive. A sense of mindfulness or more awareness about themselves is also motivating.

In the stages of change model, goals are emphasized at the preparation stage. Studies relating the self-determination model to the stages suggest that goal setting is an important thing to do at every stage. Behavior change is a dynamic process that can be enjoyed over a lifetime.

Today the choices we make regarding healthy behaviors definitely impact not only our own lives but society as well. Behaviors, such as alcohol use, speeding, and texting while driving are behaviors that significantly impact public health. In the first six months of 2021, more than 21,450 people were killed in car accidents. According to the National Safety Council, the leading causes of traffic fatalities are alcohol, speeding, and distracted driving, which includes talking on the phone, texting, or eating while driving (*Figure 13*). A majority of health problems throughout the world, such as heart disease, diabetes, stroke, and some cancers, can be attributed to unhealthy lifestyle. In America, tobacco use, overeating, and alcohol abuse are factors in nearly one-third of deaths annually. It may behoove us to put as much of our attention to helping people make lasting behavior changes as we place on finding new treatments or drugs.



*Figure 13.* The choices we make affect others as much as they affect us.

## BEHAVIOR CHANGE REQUIRES SUPPORT

We are our own first line of support required to make healthy choices and establish a healthy lifestyle throughout our lives. Acceptance coming from within yourself positions you to succeed. Deeply believing that you, your mind and your body, are of inestimable worth right now, just as you are, places you in a position of autonomy. With this autonomy you choose to be healthy, to honor and respect who you are. **You respect yourself to such an extent that you do not want behaviors in your life that are harmful to you, and you want to choose behaviors that are good for you.** Without this line of support from yourself, you probably are operating from what feels like a void. The feeling of void leaves you with your abilities and your behaviors for your identity. This void may feel like a compelling hunger to be accepted. These feelings motivate you to compromise your autonomy and put your life in others' hands rather than your own.

# Mindset Supports Your Desire to Change

The concept of mindset, articulated by Dr. Carol Dweck, the Lewis and Virginia Eaton Professor of Psychology at Stanford University, provides another look at the importance of giving support to ourselves. It brings much of what we have discussed in this chapter into focus and provides a deeper look into why healthy behavior change can be so challenging. Dweck's own motivation comes from the excitement of seeing people thrive and the sadness that comes from observing wasted potential. Mindsets are just beliefs but can be very powerful when it comes to wellness. The beauty is that we can change our beliefs and our mindsets.

Dweck categorized the two mindsets she developed as fixed mindset and growth mindset (*Figure 14*). If we have a fixed mindset, we think our abilities cannot be improved upon, so rather than working to change, we end up defending ourselves or proving to others that we are capable. Our efforts go toward making sure others know that we are good enough. Dweck calls this the path of stagnation. Those with a growth mindset believe that with new learning, then abilities, intelligence, and talents can change. Rather than being defensive about ourselves, efforts go into developing ourselves. She calls this the path of opportunity and success.



*Figure 14.* Others can help you see yourself more clearly.

In these contrasting mindsets, you will see dynamics of human behavior already discussed but now from another perspective. In the fixed mindset, performance and abilities define the individual. The person is not distinct from behavior. In the fixed mindset you have to succeed because that makes you who you are.

Because behavior is identity, when you fail at something, you feel you are a failure. People in this mindset are constantly keeping score of their successes and letting others know about them. They have a strong need to prove they are superior and of more value than others. They feel entitled and have a high degree of contingency or achievement self-esteem. If other people succeed, they feel it diminishes them. They are motivated to play it safe to be sure to succeed. Rather than being motivated to learn and change behavior, those with a fixed mindset put their energy into protecting and defending what they have because it is who they are. If you have to put effort into something such as learning, it means you are not talented or smart.

In the growth mindset, people have a more realistic estimation of abilities because a behavior is distinct from self. This makes those with the growth mindset open to feedback about where they stand. Failure is perceived as not fulfilling your potential or not taking action. These people seek challenges and learning so they can stretch. Success does not make you better than others but is just a part of growing and learning. Potential success comes with effort. Seeing others succeed is exciting.

To illustrate the fixed mindset, Dweck describes the process of some major corporations that fail. They pride themselves in hiring more talented people than those in other companies. Because their employees are expected to look and act exceptionally talented, it pushes them into a fixed mindset. Any mistake in this setting is unacceptable. Rather than admit mistakes, they would rather cover up those mistakes and lie. Eventually, they even believe they can do no wrong and are invincible. The fixed mindset revolves around thinking people are constantly judging you while you are judging them. In contrast, many top-growing companies have leaders who are constantly looking for ways to improve. They analyze mistakes, even their own, all the while having confidence that eventually they will succeed. Instead of spending their time proving they are better than others, their efforts go into their own growth. Rather than judging and being judged, their growth mindset gives them the desire to continually learn and improve. This is a process they know will take a lot of work and will need to be facilitated by support from others.

Change requires getting out of the fixed mindset. You may employ a few strategies and make some superficial improvements, but in the fixed mindset, you still approach life the same way. If you have a setback, you will tend to be really critical of yourself. You may think others are being very critical of you. You may give up entirely or even take a shortcut that could greatly harm your health.

There are strategies you can use to get out of the fixed mindset and into the growth mindset. For example, say you have a goal to lose weight. You need to realize that you are giving up a lot more than pounds off your body or a sedentary lifestyle. This is going to be tough and requires taking on a new way of looking at life and yourself. It isn't going to happen in isolation. Work with people you can trust and believe that mindsets can be changed. Find people who live the growth mindset and learn from them. Consider yourself fortunate if you already have a growth mindset.

## Get Support from Friends, Family

Our next line of support comes from others. Our friends and families and our cultures play a role in shaping how we think about our bodies, what we eat, how much we exercise, and what kinds of behaviors we consider acceptable and positive (*Figure 15*). Research confirms that if these significant people in our lives encourage us to make our own choices, it is much more effective than if they try to manipulate or control our behavior. When others are supportive, we enjoy enhanced learning, performance, motivation, and well-being.

There are many possibilities for getting help today, especially on most college campuses. If necessary, get help from professionals who conduct programs for smoking cessation or other difficult behavior changes. Consider your possible opportunities and how you can approach them with a growth mindset. Let's say you want to get more physical activity into your life. Explore your options and then make a decision. Consider the possibilities of taking a class with a close friend or doing something that you can enjoy with others. Contemplate how you will keep the growth you attained as part of your future.

Support groups in Forsyth County, North Carolina, are proving to be effective in diabetes prevention. Healthy Living Partnership to Prevent Diabetes (HELP-OD) helped 300 participants, 21 years and older,

enjoy a 7 percent weight loss and other measurable improvements. Local diabetes care centers, registered dietitians, and community health workers who are diabetes patients worked to help others avoid diabetes. The group intervention had superior results to the usual individual care program.

A rural Oregon town has its own biggest loser program. Uniting their efforts, 20 percent of their population of 450 people has lost 600 pounds so far. Their community health center initiated the program. Every Monday is a weigh-in at the clinic in Fossil, followed by a fitness class and pep rally and then a work out at the old elementary school gym. The residents are enjoying greater health and closeness as a community.

Also consider healthy behaviors that will take you out into nature with your family and friends. Nature may open up healthy behaviors that you all had not considered but could be something that adds great enjoyment and refreshment to your life. This could work to enhance your behavior change program significantly.



**Figure 15.** Your family can be a strong source of support.

## Help Yourself by Helping Others

When you willingly help others, it will be a help to you as well as those you assist. Serving others will help you feel happier and more satisfied with your life (**Figure 16**). You do not have to make helping others a grandiose event. It can be done simply and effectively day to day. Extending kindness, concern, and caring will add to your health. Sharing your knowledge about healthy living could be a good help to others. A real contribution would be encouraging members of your family to make healthy choices, too.

A report in the early 2000s showed that intervention programs that engage a team of professionals including pediatricians, school counselors, nurses, and family therapists have proven effective in helping families with healthy children, ages 8 to 15, and parents who are depressed. While gaining a better understanding of the moods of their parents, children learned resilience-type behaviors that kept them positive in their thinking. Parents improved their abilities to relate to their children. Family-based preventive medicine programs can reduce risk factors and protect family members.



**Figure 16.** Helping others is a good way to help yourself.

## BARRIERS TO CHANGE

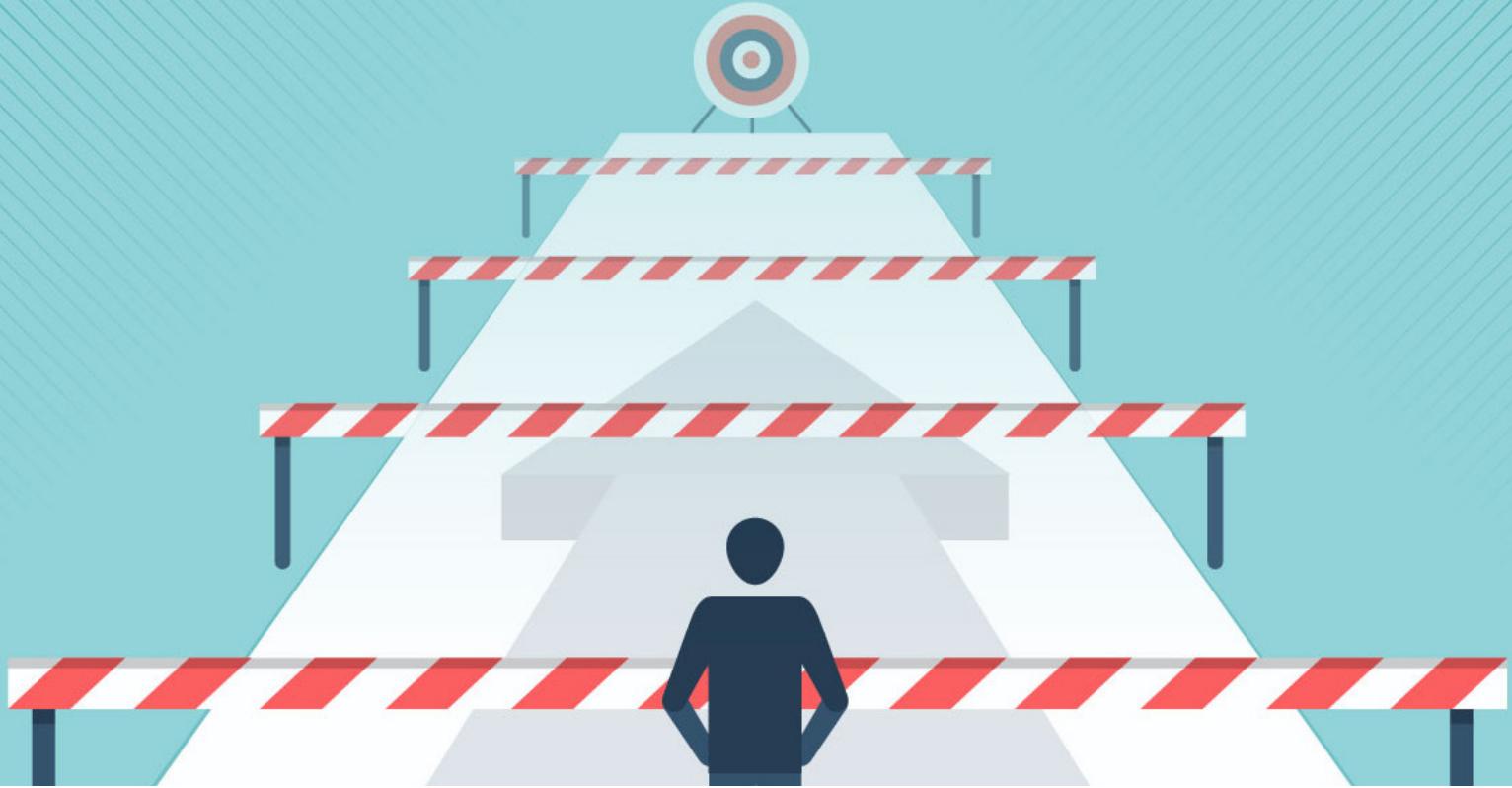
Changing your habits—what you eat, how much physical activity you get, spending habits, and so on—is not easy. When you are ready to change something in your life, it is important to be aware of the barriers that might stand in your way. If you know the barriers, you will be able to create strategies and tactics for knocking the barriers down.

### Your View of Self Matters

Barriers to change come in a lot of different forms, some more obvious than others. Time management is a more obvious challenge for most people. Finding the time to incorporate a new, healthy habit in your life is a challenge that many people have. However, there are barriers that may not be so obvious. The biggest barrier can be your own perception of yourself.

People frequently say they want to change, but struggle to make changes in their life. Why does this happen? Barriers to behavior change are a combination of factors (*Figure 17*). Following are typical examples of barriers to behavior change:

- **EMOTIONAL:** I don't feel worthy. I have accepted negative views of my body from the surrounding culture. I don't know how to change.
- **PHYSICAL:** I am overweight. I am out of shape.
- **ECONOMIC:** I can't afford gym fees. I can't afford time off work to exercise.
- **LOGISTICAL:** The gym is too far away. I can't get to the fitness center without a car. I can't fit workouts into my schedule. I don't have anyone to go to the gym with.



**Figure 17.** Identifying the barriers between you and the person you want to be is a good step toward healthy change.

## Don't Let Determinism Get in Your Way

One of the greatest barriers to change is the belief that change is not possible. Determinism is a belief that people and life are the way they are, and there is no freedom to choose to be another way. Determinism acts as a barrier to change because it can make people believe that who they are is already determined; they feel that they can do nothing about their situation.

Common forms of determinism that affect one's behavior include economic, cultural, and genetic determinism. That is to say, a person may feel that their behavior is unalterably determined by how much money they have, their culture or environment, or by their genes. While these factors can make it harder to change, it does not mean they can't be overcome. It does not mean one should not try. Socioeconomic barriers can be overcome, and today even genetics can be addressed.

Epigenetics, the study of how gene activity can be changed, is beginning to minimize genetic determinism. We now know that gene expression can be altered by behavior while the DNA blueprint remains the same.

The act of making immediate and long-term decisions activates different parts of the brain. Researchers from Princeton, Harvard, and Carnegie Mellon Universities collaborated on brain research studying 14 Princeton students. Using functional magnetic resonance imaging (fMRI), they observed brain functioning when students were making short-term and long-term decisions. Both types of decision making activated parts of the brain associated with abstract reasoning. However, the short-term decisions, which carried the possibility of immediate reward, activated the part of the brain associated with emotion. Whereas health behavior change may require long-term decisions, choosing healthy behavior often means foregoing immediate pleasures to accomplish long-term results. The normal functioning of the brain may make it more challenging to stick with a long-term health plan.

Some barriers to change are very real; others are little more than excuses for not wanting to change.

**Whether real or imagined, barriers tend to keep us from making necessary changes.** To overcome these barriers, you need to take action.



**Figure 18.** Your mind is powerful and a negative attitude toward your body can be a major barrier to change.

## Overcoming Barriers to Behavior Change

Sometimes people underestimate the power of the mind. Having a negative attitude toward your body, for example, is not a casual thing. Negativity disrupts the harmonious functioning of mind and body. If you feel dissatisfied with your body, the dissatisfaction is not only a barrier to changing your behavior but is detrimental to your overall health and well-being. From the following examples, it is evident that body dissatisfaction can be very discouraging and reduces motivation for choosing a healthy lifestyle. You will also see that body dissatisfaction is not just related to weight and can occur early in life (*Figure 18*).

Negative attitudes we have toward body shape and size are as harmful to health as are problems with the body itself. The stress of body dissatisfaction clearly produces stress in the lives of individuals. For this reason, researchers are looking at the issue of body dissatisfaction.

Body dissatisfaction is being found in children as young as 6 years old. These attitudes are not necessarily correlated with weight. A study of 58 6-year-olds found that 89.5 percent of the 38 children who were in their normal weight range expressed negative attitudes toward their body size. Only 12 percent of the children indicated that they were satisfied with their bodies. The body dissatisfaction expressed by the children correlated with parental attitudes. We can be passing on the stresses we feel to children whether the concerns are verbalized or not.

Not only are children dealing with subtle messages, but in some cases, they have to deal with aggressive behavior. Children who are overweight or obese can be the targets of insult and rejection. Weight-related criticism (WRC) is a term scientists are using to describe teasing that is focused solely on body size or weight. One study discovered that fifth and sixth graders demonstrated greater body dissatisfaction if they were the subjects of this type of bullying. Those who have been so bullied are more prone to anger, anxiety, and depression. These children also choose to isolate themselves from others and usually choose sedentary activities rather than being physically active. They are also at increased risk for disordered eating and for internalizing problems. These children are the most resistant to attempts at behavior change and display lower levels of confidence.

As we discussed earlier in this chapter, experts in motivation identified the three main psychological needs that, if met, result in greater health and well-being—autonomy, competence, and relatedness. The weight-related criticism research shows that already in pre-adolescence, the children with body dissatisfaction are lacking in the development of all three of these factors that are basic to mental and physical health.

Body dissatisfaction is a problem that is being observed throughout the world, especially for young girls who have been exposed to Western media influences. Attitudes also relate to economic status. In poorer regions, larger body size is acceptable. In those areas with a higher economic status, girls express a greater desire for thinness. The social stress regarding weight is most strongly felt by Whites, especially girls and women. As a whole, African American women and Hispanic women do not feel as pressured to be thin.

More attention is now being paid to body dissatisfaction of men. As girls and women are feeling pressure to be thin, it has become clear that boys and men are feeling pressured to be more muscular. Taken to an extreme, the distress from the pressure for muscularity could lead to behavior that interferes with relationships, employment, or health. Obsession with needing to develop muscles could lead to inordinate time spent in the gym to the neglect of work or family and friends.

## Devising Positive Ways to Overcome Barriers

Looking at the whole person enables us to devise positive and innovative ways to overcome barriers to behavior change. Dr. David Eisenberg recognized that one of the great barriers to good health today is poor eating practices. He was motivated by research that showed the influence that physicians' health behaviors have on their patients. If physicians wore seat belts or did not smoke, they also encouraged patients to do the same. Eisenberg came up with the idea of having Harvard faculty work with the faculty of the Culinary Institute of America (CIA) to sponsor clinics on nutrition and cooking for medical personnel. He thought one of the best ways to influence people to adopt better eating habits was to help medical doctors improve their eating and also their cooking skills (**Figure 19**).

At these clinics, physicians are taught the principles of nutrition and healthy eating, and they learn how to cook healthy meals. Research shows that people who cook at home are at lower risk for obesity and chronic diseases, but many today do not have the skills or do not take the time to cook. With the physicians having this experience, the hope is that they will pass on this knowledge and these skills to their patients. After attending this conference, one internist taught cooking, went grocery shopping, and started a wellness program for his patients. His patients enjoyed definitive health improvements even if they did not need to experience any weight loss.

A part of Eisenberg's dream is to take this same program to college campuses. The goal of the conference is to translate food science into practical knowledge about cooking techniques and recipes to make these relevant to the average person and prove that this novel approach can improve the health of many Americans. In his PowerPoint lecture, Eisenberg wrote, "Imagine if identical teaching kitchens were built at major colleges and were as essential as computer labs for the next generation of college graduates. Both enable students to master necessary life skills for the 21st century." Overcoming this barrier to healthy living, students would make wiser food choices while being mindful of costs; prepare their own food for enjoyment and not just survival, which would help to prevent illness and optimize health; and help sustain the environment by choosing local foods with smaller carbon footprints.



*Figure 19.* When someone learns healthy behaviors they may pass them on to others.

## CREATING A PERSONALIZED BEHAVIOR CHANGE PROGRAM

It is important to remember that wellness is living in harmony and balance with all dimensions of you: physically, emotionally, mentally, socially, occupationally, environmentally, spiritually, and financially. The concepts discussed in this chapter can be applied to all parts of life, such as improving your study habits, better managing your money, or planning your career.

Some behavior changes—say, eating an extra piece of fruit every day—are pretty easy to accomplish. Others, such as saving money to buy a car or paying off student loan debt, are difficult and can take a lot of time and effort. Any kind of change, however, is more manageable if you have a plan. Of course, planning isn't always the easiest or most enjoyable way to spend your time, but when you go to the trouble of creating a plan for changing a behavior, you give yourself the following advantages:

- When the plan is in place, you just need to follow it. The plan tells you what steps to take, so you won't need to make things up as you go.
- A plan makes it easier to be consistent.
- Because your steps are mapped out, you can start slowly and make incremental progress toward your goal over time.
- It's easier to track your progress if you have a plan to measure your efforts against.
- If you experience a setback, a plan can help you get back on track.

After you reach your goal, you can adjust your plan to maintain your accomplishment or to achieve a more challenging goal.

### Step 1: Self-Assess

To start planning your behavior change program, examine certain aspects of yourself and your life that relate to your goal. This course provides a number of self-assessments in all areas of wellness that will help you get a clear picture of where you are today. Understanding how your current attitudes, perceptions, and behaviors affect your life will give you a starting point (*Figure 20*). Doing so will help ensure that you fully understand the nature of your goal, what you will have to do to achieve it, and how to get and stay motivated:

- **STRENGTHS:** What makes this a good time to start working on your goal? In what ways are you ready?
- **AREAS OF IMPROVEMENT:** In what ways are you personally unprepared or underprepared to start working toward your goal? This question may apply to your mindset, your commitment, or some aspect of your health. For example, if you want to start exercising but are obese, have you talked to your doctor first?
- **NEEDED RESOURCES:** What do you need to be successful in your efforts to change? A pedometer? Software that helps you create and manage a budget? A planner to help you manage your time?
- **SUPPORT PEOPLE:** Who can you recruit to help you achieve your goal? This may be a friend who occasionally asks about your progress, or a trainer who develops an exercise plan for you. Or it may be someone who has the same goal and can work along with you as a partner.
- **BARRIERS:** What might prevent you from reaching your goal? It may be a circumstance in your environment (no place nearby to jog, for example) or something within yourself (such as serious self-doubt).
- **MOTIVES AND MOTIVATORS:** Why is this goal important to you? How will your life be improved by achieving it?

As you answer these questions about yourself and your goal, write down your answers and incorporate them into your plan. This way your plan can leverage your strengths and include strategies for improving areas of weakness and overcoming barriers.



*Figure 20. Self-assessment is important. You need to know where you are so that you know where you are going.*

## Step 2: Set SMART Goals

SMART is an acronym that means goals are **S**pecific, **M**easurable, **A**ttainable, **R**elevant, and **T**ime-bound.

Before you begin working toward your goal, you should have a long-term goal and at least one supporting short-term goal, and they should both be SMART goals. Consider these examples for someone who wants to start a walking program for exercise:

- **Long-term goal:** At the end of a four-month training period, be able to walk 10,000 steps, 3 days per week. These steps are to be taken as exercise, in addition to normal daily activity.
- **Short-term goal:** Start by walking 1,000 steps on 3 days of the first week and increasing walks by 500 steps each week in weeks 2–12, and then increasing them by 1,000 steps each week during weeks 13–15.

## Step 3: Create a Strategy, Make the Commitment

With a good understanding of your strengths, weaknesses, and motivations, and with a set of clearly defined goals, you're ready to devise a strategy for putting your plan into action. Create a list of specific steps that you need to take and set a time frame or a deadline for each and every one of them.

Map your plan out over time and think of ways to work around obstacles. For example, how will you practice your meditation if you have to go on a business trip? How will you exercise if the weather turns bad or if your workout partner can't make it? Your plan should give you options when things don't go exactly the way you visualized them.

Before you start, make a commitment to your program. It may sound corny but writing a contract with yourself actually can help. Print one up, sign it, and put it on display where you will see it often. Remember: you're making a promise to yourself to live better. That's a promise worth keeping!

## Step 4: Track Progress, Make Adjustments

It's important to track your progress every time you work toward your goal. If you're trying to quit smoking, a daily journal can be tremendously helpful. If you start a weight-training program, a chart or log that tracks your weekly sets and reps can also be a motivational tool (*Figure 21*). If your goal is to save money, a budget is a good tool for keeping track of your income, spending, and saving. In addition to checking off your daily accomplishments, you can also make notes about barriers you encountered and overcame. Your tracking tool does not need to be elaborate or expensive. Keep it simple so it doesn't require too much time or effort.

As you track your progress, analyze it. Are you progressing faster than you thought? Then you may be able to adjust your goal to achieve a more significant result or shorten your program to get there faster. Does your tracker show that you aren't progressing as quickly as you hoped? Then modify your program to give yourself more time or to make progress in smaller increments. You need to be good to yourself during the process of change and not push too hard. That can lead to giving up. So be ready to change up your program whenever needed and in the way that works best for you.



**Figure 21.** A calendar or diary is a good way to make notes about your progress toward your goals.

# MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Recognize any barriers that might make it difficult for you to make changes that will enhance your own healthy living. Identify specifically what you will do to overcome these barriers.
2. Understand the basis of your self-esteem. Which of these do you believe?
  - a. I think each person has to earn his or her value. My self-esteem is dependent on meeting conditions important to me.
  - b. I think each person has inherent value. My self-esteem embraces my own inherent value that is always present.
3. Identify if you have a growth mindset or a fixed mindset. If you have a fixed mindset, what will you do to move toward a growth mindset?
4. Select a behavior you desire to change. Recognize the stage of change in which you find yourself regarding this behavior. Develop and carry out your plan for change.
5. Contemplate what support you need to help you make a specific behavior change. Make a plan to enlist that support.
6. Acknowledge your confidence to make needed changes and establish a healthy lifestyle for yourself. Believe you are able to be a good influence to help others make positive changes in their lives.

## SUGGESTED READINGS

- › Covey, Stephen R. 2004 *The Seven Habits of Highly Effective People: Powerful Lessons in Personal Change*. New York: Simon & Schuster, Inc.
- › Dweck, Carol. 2017 *Mindset: Changing the Way You Think To Fulfill Your Potential*, London: Little, Brown Book Group
- › Ryan, R. M., & Deci, E. L. *Self-determination theory: basic psychological needs in motivation, development, and wellness*. 2017. NY: The Guilford Press.

## GLOSSARY TERMS

**Achievement self-esteem:** A good feeling about yourself that comes as a result of approval from others, money, appearance, competence, or some other contingency.

**Action stage:** The stage of the TTM in which people have actively made changes in their behavior over the past six months.

**Autonomy:** One of the three psychological needs that make up the self-determination theory (SDT) of behavior change that means you are in charge of your choices and you accept responsibility for your health.

**Determinism:** A belief that people and life are the way they are, and there is no freedom to choose to be another way.

**Body dissatisfaction:** Negative feelings about your own body that make your body unacceptable to you.

**Contemplation stage:** The stage of the TTM in which people are intending to change their behavior within the next six months.

**Contingent worth:** The perspective that the individual value of each person must be earned and is dependent or contingent on some person or thing.

**Extrinsic motivation:** Behavior that is controlled or motivated by others or by some external reward.

**Intrinsic motivation:** Behavior that is motivated by self-interest; internally interesting or satisfying.

**Intrinsic worth:** The perspective that the individual value of each person is innate or inherent and cannot be earned—it is not an object of gain.

**Precontemplation stage:** The stage of the TTM in which people are not ready to make any changes within the next six months.

**Preparation stage:** The stage of the TTM in which people are intending to change their behavior within the next month.

**Maintenance stage:** The stage of the TTM in which people have changed their behavior and continue these new behaviors for another six months.

**Self-acceptance self-esteem:** A good feeling about yourself that comes as you accept your intrinsic value.

**Self-determination theory:** A model for behavior change based on the belief that humans have natural, intrinsic tendencies to make healthy and effective choices.

**Self-efficacy:** The belief that you are able to succeed at what you set out to do.

**Self-talk:** Inner speech or thoughts that you generate within your own mind that pertain to your acceptance or non-acceptance of yourself.

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Enjoy Nutritious Foods

# Am I What I Eat?

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Eating well provides many more benefits than just good nutrition. Eating is one of life's great pleasures! It affords opportunities for enjoyment, stimulation of the senses, and relaxation. We use food to celebrate, socialize, and spend time with family and friends. Even when we eat alone, we can take time to savor good flavors and appreciate the earth's bounty. Good food nourishes more than just our bodies!



## After reading this chapter, you will be able to:

- › **IDENTIFY** the benefits of a good diet.
- › **EXPLAIN** how your emotions and environment can impact your nutritional health.
- › **IDENTIFY** types of nutrients and explain how they contribute to a healthy diet.
- › **APPLY** nutritional guidelines to your diet.
- › **APPLY** knowledge of the body's energy systems to make good food choices and maintain a healthy weight.
- › **USE** food labels to make wise dietary choices.



# Am I What I Eat?

enjoy nutritious foods

## THE BENEFITS OF EATING WELL

Whether we get all the benefits of good food depends on a variety of factors, including our stress management skills, our eating practices, the environments in which we eat, and our attitudes and thinking. Research has shown that positive attitudes and emotions enhance healthful chemical reactions when we eat, and negative attitudes and emotions interfere with them. If you are stressed out, upset, anxious, worried, or in a hurry when you eat, your emotions can detract from the potential benefits of your food—even if you are selecting nutritious foods.

## How Stress Influences Digestion

Let's face it—most of us live in a fast-paced, high-stress world, and health reports link stress to just about every malady we experience today including headaches, stomachaches, insomnia, or even more serious disorders. Does this mean that we must suffer from the ill effects of stress? Certainly not. There is much we can do to combat these ill effects—but first, let's consider the effects of stress on **digestion**.

### Increased Stress Slows Digestion

Researchers have found that the gastrointestinal tract is strongly affected by stress. Stress brings about the “fight or flight” response. It doesn’t matter if the stressor is internal, external, mental, emotional, or physical—the body reacts in the same way. As the body prepares to defend itself from a threat, it releases hormones that heighten the functions needed for defense and slow down or halt other normal functions, including digestion. The result is that food remains in the stomach and intestine longer than usual.

Normally, food stays in the stomach for only about 30 minutes; then, the intestines take up to 72 hours to complete the digestive process. If food remains in the intestines longer than that, it can ferment and stagnate, releasing toxins into the bloodstream.

Slowed digestion may initially cause discomfort in the form of indigestion, stomachaches, or diarrhea. Prolonged stress may lead to functional gastrointestinal disorders, such as irritable bowel syndrome (**Figure 1**). It has been reported that 25 million Americans have a functional gastrointestinal disorder. Although many of these disorders are not initially caused by stress, they are exacerbated by it. For a fascinating discussion of the digestive problems linked to stress, see the book *Why Zebras Don't Get Ulcers* by popular Stanford University neuroscience professor Robert Sapolsky.



**Figure 1.** Too much stress can affect your digestion.

Some stress hormones have contradictory effects on digestion. For example, when corticotropin-releasing hormone (CRH) is released, it directs the adrenal glands to produce steroids and adrenaline to help combat the stress one is feeling. CRH and adrenaline inhibit the appetite, but steroids may increase hunger. Although the effects of these compounds may be mixed, what is clear is that stress negatively affects digestion.

## Lower Stress Enhances Good Digestion

On the other hand, the lack of stress at the time of eating enhances good digestion. Years ago, Dr. Deepak Chopra used a delightful image in one of his earliest books, *Quantum Healing*. He wrote, "When we are happy, we make six trillion cells happy." Think of a time when you were approaching a festive meal and were relaxed and enjoying the company of loved ones. Your mind and spirit were engaged, along with your physical senses. As you imagine this time, smelling the delicious food and anticipating your favorite tastes, can't you just picture the "happy smiles" on your trillions of cells?

## The Connection Between Stress and Digestion

What is the nature of the connection between stress and digestion, between the brain and the stomach? Recent research has shown that 95 percent of the body's receptors for serotonin, a neurotransmitter important for its role in regulating metabolism, mood, sleep, and body temperature, are located in the gut.

In addition, an independent network of some 100 billion neurons, more than are found in the spinal cord, has been discovered in the gastrointestinal (GI) tract. These and more discoveries are detailed in a book about the stomach called *The Second Brain*, written by Columbia-Presbyterian Medical Center neurobiologist Michael Gershon, M.D. The book describes the growing evidence for a remarkable two-way communication system between the "first brain" in your head and what he calls the "second brain" in your GI tract. Maybe there's more to "gut feelings" than we give credit!

Good digestion is fostered by positive emotions and thoughts. Try these recommendations to enhance your digestion:

- Establish an environment within yourself for both of your "brains" to function well.
- Be peaceful, consider your breathing, and relax.
- Be aware of your gratitude for the food before you eat.
- Try just eating and not doing anything else—this means no television or cell phone!
- As you begin to eat, chew your food well before swallowing—20 times or so.
- Take the time to taste your food and enjoy it.
- Limit fluids at mealtime in order to not dilute your digestive juices.
- Remember that your stomach needs room to digest the food—try to not stuff it too full.
- Take a peaceful walk after your meal.

Good digestion provides the nutrients your cells need to function properly. Energy for your day and good health are benefits of wise eating. There is so much you can do to enhance your digestion and avoid common digestive problems. This is just the beginning. Let's see what more you can do.

## How Do Eating Practices Affect Your Diet?

Our eating practices and the environment in which we eat also affect our ability to benefit from the food we consume. Not too long ago it was common for families to sit down at the dinner table and enjoy a meal together, without the television on. If you are one of the rare individuals whose family still sits down to a homemade evening meal, consider yourself extremely fortunate.

Nowadays, eating meals outside the home is common, and fast food is an established part of American culture. However, fast foods often have higher sugar content and contain processed oils (*Figure 2*). Studies show that people who eat fast food consume more saturated fat and total fat and eat fewer fruits and vegetables than those who don't eat fast food. Fast-food eaters also tend to have more body fat and are more susceptible to chronic diseases, such as heart disease, cancer, and diabetes.

It isn't necessary to completely avoid fast food—we can be wise consumers of fast food. There are healthy choices to be made. A useful guide is *The Stop & Go Fast Food Nutritional Guide*, written by Steve Aldana, Ph.D., with the advice of a panel of nutrition experts. In this book, the author categorizes fast food into three groups: foods to avoid, foods to eat sparingly, and foods that are healthy. Using a guide such as this, we can enjoy healthy eating even if we sometimes eat fast food. However, we must truly be wise consumers to avoid potentially serious health problems.



**Figure 2.** When you are short on time, fast food may seem like a good, cheap solution, but these foods are often high in fat and sugar content.

What can you do in today's world to emulate the ideal of an evening meal eaten at home? Even if you live alone, you can take the time to set a place at a table and sit down to dinner. What difference does it make, you ask? When you establish a pleasant environment, free of distractions, you tend to relax more, eat more slowly, pay more attention to your food, and enjoy the pleasure of the meal. When you are relaxed, your digestive system works better and your body can function optimally. If you stand at the counter watching television, you will most likely gulp down your food without noticing what you're eating. Your body gets the message to hurry up, and you miss the pleasure of good eating. If you eat on the run, just getting something into your body to appease your hunger, you're forfeiting an important part of your life. Eating is one of the joys of life, not just a necessity.

## How Emotions and Attitudes Affect Your Food Choices

Have you noticed that some people tend to accept those who are eating junk food and poke fun at people who are eating healthy food? Why would we ridicule someone who is taking good care of him- or herself? Why would someone need to defend eating fruits and vegetables? It's true that some people take good nutrition to an extreme, getting overly focused on health foods or dietary supplements. But healthy eating does not call for extreme measures—although it might take a little courage for you to assert yourself when your friends want to get burgers and fries every day. In fact, healthy eating doesn't have to be a big deal at all—it can be very simple. Choosing healthy foods is also cost effective. Simple whole foods usually cost the individual consumer less than highly processed foods, and the individual and society gain monumental savings in health care costs when people make good choices about what they eat and drink.

To start eating a more nutritious diet, you may have to begin with your attitudes and beliefs. Have you internalized the cultural attitudes about junk food versus healthy food? Do you subscribe to the belief that it doesn't matter what you eat now because you're young and healthy and any ill effects are decades away? Today even very young people show signs of cardiovascular disease as a result of poor diets, and overweight and obesity have grown to epidemic proportions, not just in adults, but also in adolescents and children. It makes sense to examine your priorities. What are you thinking when you're hungry? Do you just want to fill your stomach? Do you want something convenient so it doesn't take you too long to eat? Are your food choices driven by cost, taste, or availability? Do you eat what your friends eat?

What about nutrition? Do you consider the nutrient content of the foods you might choose? If not, what would it take for you to think of nutrition first? Taking the nutritional content of food into account when you are considering food choices and planning meals reflects a more complete, holistic attitude toward your health. It reflects more reverence for your whole self—your body, mind, and spirit. It takes maturity, a sense of responsibility, and wisdom to make healthy choices. In some schools of thought, the body is considered the temple of the spirit, and as someone once said, "You can't build a temple out of Twinkies!"

## Enjoy a Nutritious Diet

Are you what you eat? No, eating does not make you who you are, but eating well will certainly benefit your health and happiness. Eating well reflects a measure of self-respect, a valuing of your mind and body. Eating poorly might be considered a form of self-abuse.

Sound scientific knowledge of nutrition can get you started in the right direction, but knowledge alone does not guarantee that you will eat well. Consideration of self and contemplating the kind of person you want to be throughout your life can provide positive motivation for making good choices about food and drink. It takes maturity and self-discipline to use your knowledge wisely and to choose a **diet** that nourishes your whole being. Remember these important principles:

- Recognize that how and what you eat and drink influences your whole being now and throughout your lifetime.
- Allow yourself the pleasure of healthy nutrition regardless of what others around you are doing.
- Think first and foremost of your food as providing the nutrients you need for good health.
- Choose these nutrients wisely according to individual needs and tastes.
- Cultivate tastes for good, wholesome foods—after all, it is your choice!
- Help others around you enjoy a nutritious diet.
- Enjoy an active lifestyle, using the energy your good food provides.

## NUTRIENT TYPES

Nutrients are substances that contribute to growth and are necessary to maintain life. They build and repair tissues, provide energy, and support vital bodily functions. Contemporary research shows strong relationships between a lack of nutrients in the diet and major chronic diseases such as cancer, heart disease, stroke, and diabetes. These recent discoveries highlight the importance of choosing your food wisely. More than ever before, physicians are emphasizing the importance of good nutrition to overall health.

The six classes of nutrients are proteins, fats and oils (liquid fats), carbohydrates, minerals, vitamins, and water. Proteins, fats, carbohydrates, and water are further classified as **macronutrients** because they are needed by the body in large amounts. Vitamins and minerals are classified as **micronutrients** because they are needed in relatively small amounts. If the body is unable to produce a nutrient needed by the body, it is called essential. For example, the familiar term **essential amino acids** refers to 9 of at least 20 different amino acids that the body needs but cannot make, and so must obtain from food. If there is a shortage of a particular nutrient it is called a deficiency.

# Proteins

**Protein** is the principal component of bone and muscle. Proteins are organic compounds composed of amino acids and peptides. Protein is necessary to build and repair cells and to make enzymes, hemoglobin, hormones, and antibodies. The body also uses protein for energy when other energy sources are depleted. Our bodies are made up of at least 10,000 different proteins. Protein is a nutrient that we need nearly every day because the body does not store amino acids, the building blocks of proteins (*Figure 3*).

How much protein is needed? A general rule of thumb is that we need to consume 8 grams of protein per 20 pounds of ideal body weight. On average, this comes to about 50 grams per day for women and 65 grams per day for men.



**Figure 3.** Protein is needed for all parts of our body.

Animal proteins are considered *complete proteins*, or high-quality proteins, in that they provide adequate amounts of the essential amino acids. However, proteins can also be derived from plants. Plant proteins are considered *incomplete proteins*, or low-quality proteins, because individual plants may lack one or more of the essential amino acids.

Although rich in protein, food from animal sources also tend to be higher in saturated fat. In the mid-1800s, cattle were free-range or pasture-fed and were usually slaughtered at about 4–5 years of age. As with wild animals, those cattle had little saturated fat and a greater prevalence of polyunsaturated fatty acids and monounsaturated fatty acids. With drastic changes in the way cattle are fed and raised today, they are brought to slaughter in just 14 months and have a greatly increased amount of saturated fat.

Nutritionists recommend that we eat red meat that is lean. Poultry and fish are recommended as healthy sources of protein. Fish is a good choice because it supplies important *unsaturated fats*. Plant sources of protein—legumes (including beans and soy products), nuts, and whole grains—are good because they contain *phytochemicals* (*Figure 4*). Phytochemicals are compounds that occur naturally in plants—“phyto” means plant.



**Figure 4.** Nuts are a healthy source of protein.

It is wise to get a good mix of proteins and stay within the recommended amounts per day. Not as much research has been done on the most beneficial amount of protein our bodies require, as has been done for other nutrients. However, an inadequate amount of protein is the most common form of malnutrition in the world. It is usually manifested in one of two ways: marasmus, which is severe breakdown or wasting of body fat and muscles, and kwashiorkor, which is a swelling of body tissues. On the other hand, excessive protein consumption over time may draw calcium from the bones and weaken them.

## Lipids (Fats and Oils)

Given the amount of time, energy, and money spent convincing Americans not to eat fat, you might think that all fats are bad for you. This is not the case at all! The fact is that some fats are good for us and are needed in our diet. The body uses fat as a concentrated source of energy; one gram of fat provides 9 calories of energy, compared with 4 calories for protein and 4 for carbohydrates. Fat is used as a source of energy during rest, light activity, and low-intensity exercise. Fat is also used to produce hormones and cell membranes and to assist in the transport and absorption of fat-soluble vitamins, among other functions. Finally, stored body fat serves to insulate and protect the internal organs.

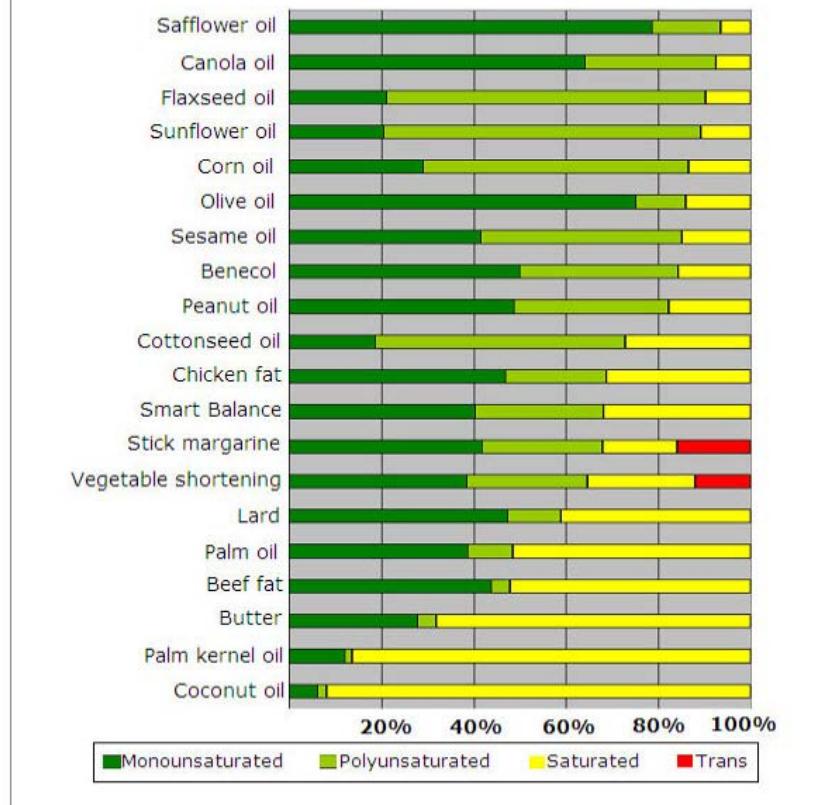
### Saturated Fatty Acids

Most fats found in food are in the form of triglycerides, which are three **fatty acids** bound together by glycerol. The fatty acids are classified as saturated, monounsaturated, or polyunsaturated, depending on their chemical structure. In any particular food, one of these types of fatty acids usually predominates.

**Saturated fatty acids** are typically found in animal fats but are also present in certain tropical oils and nuts, such as coconut and palm oil and macadamia nuts. **Monounsaturated fatty acids** are found in many plant oils, including olive oil, peanut oil, canola oil, and some safflower oil. **Polyunsaturated fatty acids** are found in corn, soybean, and cottonseed oils and in fish. **Figure 5** shows the different types of fats that are found in various oils and spreads.

## Types of fat in various oils, spreads

Harvard Health Publications  
HARVARD MEDICAL SCHOOL  
[www.health.harvard.edu](http://www.health.harvard.edu)



**Figure 5.** Types of fat in various oils and spreads. **Source:** Harvard Medical School, [www.health.harvard.edu](http://www.health.harvard.edu).

The monounsaturated and polyunsaturated fatty acids are dubbed “good fats.” Two essential polyunsaturated fatty acids are the **omega-3 fatty acids** and **omega-6 fatty acids**. The body uses these fatty acids to perform many important functions, such as regulating blood clotting and lowering blood pressure. The main source of omega-3 fatty acids is fish; another source is monounsaturated vegetable oils (**Figure 6**). Omega-6 fatty acids come mainly from polyunsaturated vegetable oils; although omega-6 is important, nutrition experts recommend higher relative consumption of omega-3.



**Figure 6.** The main source of omega-3 fatty acids is fish, such as the sockeye salmon shown here.

## Trans Fats

**Trans fats** and processed seed oils are “bad fats.” Trans fats are unsaturated fats that have been converted to a solid or semisolid form through the process of **hydrogenation**. This process has given us vegetable shortenings, margarine, and other products that have a long shelf life. Trans fats are found primarily in processed or baked foods such as crackers, cookies, pastries, and snack foods, and in commercially prepared deep-fried foods such as French fries. If you see “partially hydrogenated oil” or “vegetable shortening” on a food label, the product contains trans fat. Since January 1, 2006, government regulations have required that the presence of trans fat be identified on food labels. Many local jurisdictions have banned the use of trans fat in food and require their replacement with healthier fats, and many food manufacturers have switched to healthier fats.

Trans fats are known to be 10 times worse for you than saturated fats particularly in terms of cardiovascular disease risk. The amount of trans fat you could consume and not increase your cardiovascular disease risk is 0 grams per day! The average consumption of trans fats by adults is approximately 4 grams per day.

At the present time, there is no specified numerical value to direct positive consumption of fats and oils. A basic guideline for fat consumption is to consume less than 30 percent of your daily calories from all fats, and less than 10 percent from saturated fats. Try to avoid the consumption of trans fats and partially hydrogenated oils. Do use olive oil, canola oil, and peanut oil (*Figure 7*).



*Figure 7.* Three recommended cooking oils are olive oil, peanut oil, and canola oil.

## Carbohydrates

Like fats, **carbohydrates** have developed a bad rap in recent years, at least among advocates of “low-carb” diets. But again, as with fats, there are “good carbs” and “bad carbs” (*Figure 8*). In fact, Harvard nutritionists claim that the most important food decisions you make are choosing good carbohydrates and good fats. Carbohydrates serve as the body’s primary source of energy (and the brain’s only source of energy), especially during physical activity. They also provide much of our fiber, vitamins, minerals, and phytochemicals.

# Quinoa: All Essential Amino Acids

Quinoa (pronounced “keen-wah”) is a seed that is high in protein and a good source of riboflavin. Although this grain has been cultivated in South America for hundreds of years, it has only recently become popularized in North America because of its nutritional value. It has been reported to contain all the essential amino acids; thus, it is an unusual grain in that it is a complete protein. Quinoa is also naturally gluten-free, making it a popular substitute in foods consumed by those with gluten sensitivities.



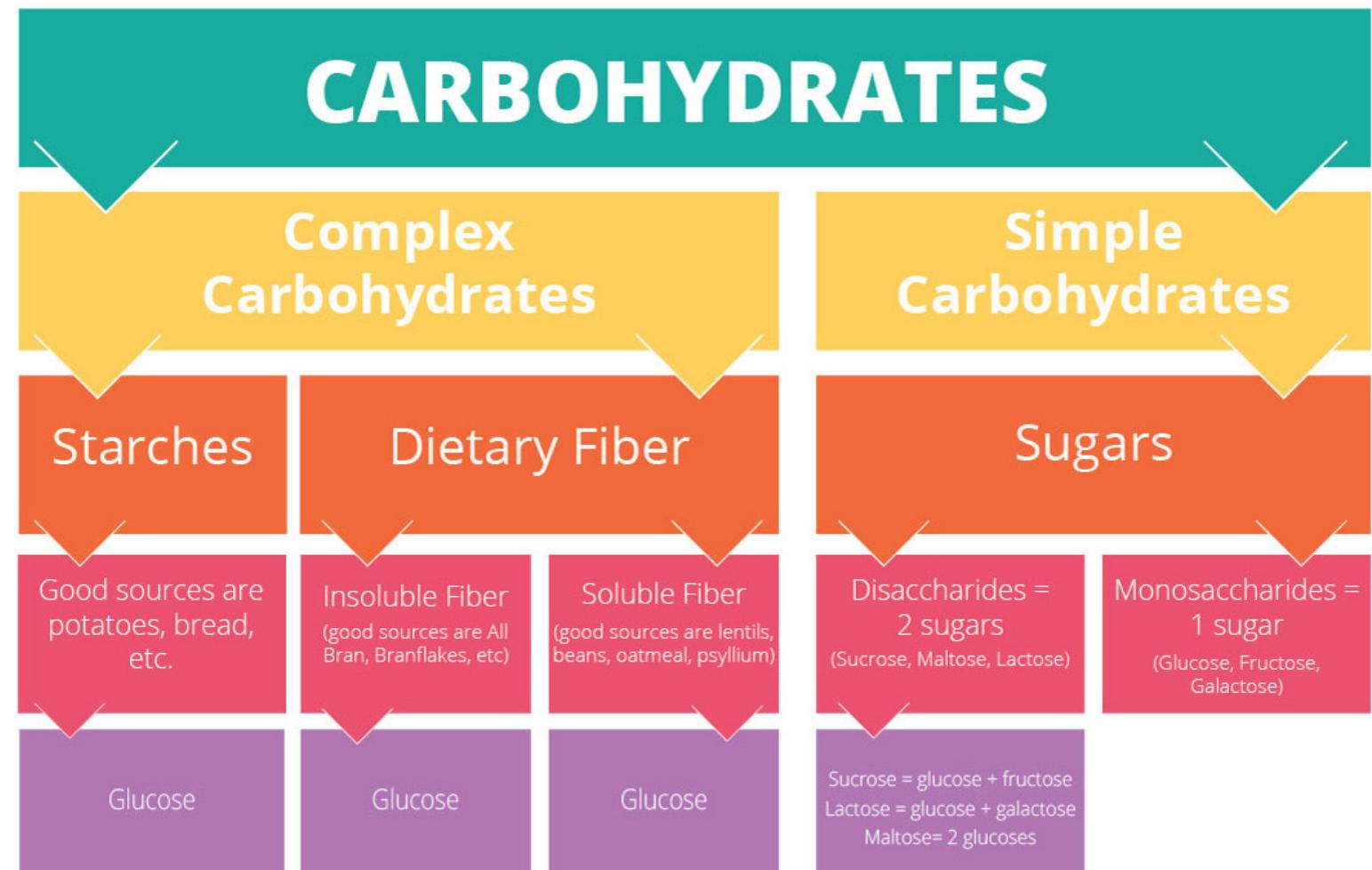
*Figure 8. Good carbohydrates are fruit, vegetables, and whole grains.*

According to U.S. government guidelines, 45–65 percent of the calories in your diet should come from carbohydrates; other sets of guidelines recommend 50 percent to 75 percent.

Most carbohydrates come from plants; the carbohydrates in milk and honey are the only ones that come from animal sources. The “good” carbs are fruits, vegetables, and whole grains. Whole grains are grains that are intact and unprocessed. Until recently, it was difficult to find whole-grain foods in the grocery store because most mass-produced foods used refined (white) flour or refined rice in recipes. Refined grains have been stripped of most of their nutrients and fiber, and while foods made from them have longer shelf lives, they often contain little nutritional value. Such foods contribute to obesity.

In the past few years, the food industry has begun making more whole-grain prepackaged foods, such as bread and pasta, and selling more whole grains such as brown rice, whole oats, quinoa, kasha, and bulgur. With more attention being paid to the nutritional value of the foods we consume, these products are becoming increasingly available in mainstream grocery stores rather than just in specialized health food stores.

Simple carbohydrates are those composed of only one (single) sugar unit in each molecule or two (double) sugars. Carbohydrates made from chains of three or more sugar molecules are complex carbohydrates or **starches**. Single sugars include fructose from fruits and galactose from milk products. Double sugars include lactose from dairy products, maltose from vegetables, and sucrose from table sugar. Starches or complex carbohydrates are found in legumes, starchy vegetables, and whole-grain cereals and bread. All the carbohydrates we eat break down into single sugar molecules in the digestive system. Most digestible carbohydrates are converted into blood sugar, called glucose, which the body uses for energy. Non-digestible carbohydrates are called dietary fiber. They pass through the body and facilitate elimination (fiber is discussed in a later section). *Figure 9* shows this carbohydrate categorization and breakdown.



*Figure 9.* Carbohydrate categories, types, and molecules.

## Glycemic Index and Glycemic Load

In a newer conceptualization of carbohydrates and their effects on the body, more attention is being paid to the glycemic index and glycemic load. The glycemic index measures the impact that foods have on levels of glucose in the blood. Foods that cause a rapid rise in blood glucose have a high glycemic index. Those with a slower, more moderate effect on blood glucose levels have a lower glycemic index. Highly refined and processed foods tend to have a high glycemic index—they produce a fast spike in blood sugar and a quick burst of energy, followed by a sudden drop in energy and feelings of hunger. Eating whole grains keeps blood glucose at more moderate levels and helps maintain feelings of fullness.

Glycemic load is a measure of the actual carbohydrates in a food, arrived at by multiplying the food's glycemic index by the number of grams of carbohydrate it contains divided by 100. For example, carrots have a glycemic index of 131. This appears to be high, but the carbohydrate content is only 4 grams, so the glycemic load is only about 5 ( $131 \times 4 / 100 = 5.24$ ). The glycemic load, therefore, is a better indicator of a food's effect on blood glucose than the glycemic index alone (*Figure 10*).



**Figure 10.** In terms of glycemic load, which is better: an apple or strawberry preserves?

## Glycemic Factors Measure Effect on Blood Sugar Levels

These glycemic factors are important to understand because they measure a carbohydrate's effect on blood sugar levels, which in turn impact levels of insulin in the blood. A quick rise in blood glucose is accompanied by rising levels of insulin. Insulin serves to move the glucose out of the blood and into the body's cells. A high spike in blood glucose is usually followed by fast blood glucose depletion, setting up a glucose-insulin roller coaster. Eventually, this roller coaster action may result in insulin resistance, where cells do not respond to insulin properly, or lead to an impairment of the pancreas's ability to produce insulin properly. Both of these problems can lead to the development of type 2 diabetes. Highly refined carbohydrates such as white bread, white flour, and white rice contribute to glucose-insulin spikes and free-falls, whereas whole grains and other good carbohydrates contribute to slower, steadier digestion. Poor insulin production and insulin resistance have not only been associated with diabetes but also with heart disease, high blood pressure, and some cancers.

Awareness is certainly growing that getting more whole grains, fruits, and vegetables into the diet and avoiding refined foods is significant to good health. However, deciding exactly which foods to eat based on their glycemic index is complicated by several factors. For one thing, a food's glycemic index isn't obvious from its composition. For example, a white potato is a complex carbohydrate with a very high glycemic index, while some fruits, which are simple carbohydrates, have glycemic indexes in the moderate range. Additionally, a food's glycemic index doesn't necessarily indicate its nutritional value. A white potato and a candy bar may have similar glycemic index values, but the potato contains additional valuable nutrients not found in the candy bar.

The glycemic index and load are helpful for the most part but do have their limitations. Always select good whole foods and use the glycemic charts and numbers to help guide and refine your choices.

## Carbs Affect People Differently

People can have different responses to carbohydrates based on their fitness level. Athletes are advised to consume a high-carbohydrate diet because they need the energy it provides to sustain their physical activity. But researchers at Harvard University also say that overweight people should avoid a high-carb, low-fat diet, especially if most of the carbs are from highly refined foods.

What does all this mean in terms of selecting carbohydrates that are nutritious? The bottom line is that we all need to consume most of our carbohydrates from whole grains, fruits, and vegetables, and avoid sugary and highly processed foods. Dr. Willet, of the Harvard School of Public Health, suggests that for optimal health we aim high and eat more and different fruits and vegetables. Similar to the government's recommendations, he recommends that we keep variety and color in mind, choosing at least one serving per day from each of the following fruit and vegetable categories:

- Dark green, leafy vegetables
- Yellow or orange fruits and vegetables
- Red fruits and vegetables
- Legumes (beans)
- Citrus fruits

The U.S. Centers for Disease Control and Prevention (CDC) has a campaign called the National Fruit and Vegetable Program that makes suggestions for fruit and vegetable consumption based on an individual's age, height, and weight. You can visit the program website at <http://www.fruitsandveggiesmorematters.org>.

## Fiber

Fiber, also called **dietary fiber**, is a form of carbohydrate that cannot be digested. It comes from the plants we eat—fruits, vegetables, whole grains, and **legumes**. Fiber from grains is known as cereal fiber. Fiber is classified according to whether it dissolves in water—soluble fiber partially dissolves in water while insoluble fiber does not. Both types play an important role in preventing diabetes, heart disease, diverticulitis, and constipation. During digestion, soluble fiber binds cholesterol-rich bile acids into the stool. The removal of cholesterol from the body lowers the risk of cardiovascular disease. Insoluble fiber acts like a sponge, binding water and softening the stool. It also helps slow the absorption of sugars and fats, preventing the glucose-insulin spikes discussed earlier. It is very clear that fiber plays a major role in maintaining good health.

The main dietary sources of soluble fiber are oats, nuts, legumes, apples, pears, strawberries, and blueberries. The main sources of insoluble fiber are whole wheat, barley, couscous, brown rice, bulgur, carrots, cucumbers, zucchini, celery, and tomatoes. Quinoa contains both insoluble and soluble dietary fiber. The dietary recommendation for fiber in adults is 20–40 grams per day (**Figure 11**).



**Figure 11.** The best sources of fiber are whole grains, fresh fruits and vegetables, nuts, and legumes.

## Vitamins and Minerals

Vitamins are organic micronutrients, while **minerals** are inorganic micronutrients. They do not provide energy, nor does the body break them down. Instead, they are used to regulate and facilitate chemical processes in the body that are part of our **metabolism**, conversion of macronutrients to usable forms of energy, synthesis of blood cells, maintenance of the immune system, repair of bones and tissue, and more. When the diet lacks a vitamin or mineral, symptoms of a specific deficiency eventually appear. There are also negative effects from consuming too much of certain vitamins and minerals. The government sets guidelines for adequate and safe levels of each micronutrient.

### Vitamins

There are 13 essential vitamins that must be consumed in the diet (**Figure 12**). Four of these essential vitamins are fat-soluble—vitamins A, D, E, and K—and can be stored in the body rather than excreted in the urine. The nine water-soluble vitamins include C and the eight B vitamins. These are not stored in the body and are excreted in the urine.



**Figure 12.** There are several essential vitamins that are crucial to maintaining good health.

## Minerals

Minerals help regulate fluid balance, conduct nerve impulses, and contract muscles. There are 17 essential minerals, classified as major minerals or trace minerals. The body needs 100 milligrams or more of the major minerals per day, and only minute amounts of the trace minerals. The major minerals are calcium, sodium, potassium, magnesium, chloride, and phosphorus. Trace minerals include zinc, iron, copper, manganese, selenium, iodine, fluoride, and molybdenum. The minerals we hear the most about today are calcium and iron. Calcium helps to prevent **osteoporosis**, a chronic disease characterized by porous bones that affect both women and men as they age. Iron helps to prevent anemia, a deficiency of red blood cells.

## Antioxidants

**Antioxidants** are vitamins and other substances in foods that help protect the body from damage caused by **free radicals**—the product of certain chemical reactions within the body and exposure to environmental hazards like ultraviolet radiation from the sun. Among the most effective antioxidants are vitamin C, vitamin E, beta-carotene, and related carotenoids; the minerals selenium and manganese also help by strengthening the enzymes that destroy free radicals. Antioxidants belong to a larger category of substances known as phytochemicals, which are non-nutrient compounds found in plant foods that seem to play a role in the prevention of many chronic diseases, including cancer. They are yet another reason to eat a lot of fruits, vegetables, and whole grains.

## Supplements

The Food and Nutrition Board of the National Academy of Sciences recommends that most people get vitamins and minerals from the food they eat rather than from supplements. Vitamin and mineral supplements do not provide the phytochemicals that are found only in whole plant foods. However, specific recommendations regarding supplements are given for certain populations, such as pregnant women, people over 50, and smokers. In addition, nutritionists recommend that American adults take a daily multiple vitamin in addition to eating a healthy diet, but never in place of eating well. This recommendation is made because the average person does not eat well enough to get enough certain key vitamins that help prevent chronic diseases, particularly folic acid, vitamin B6, vitamin B12, vitamin D, and vitamin E.

## Water

Of all the nutrients, water is the one most needed for survival. It's possible to survive for weeks without food, but only days without water. The human body is about 60 percent water, so you can see why proper hydration is required for good health (*Figure 13*). We do get a lot of water from food, especially fruits and vegetables, and other beverages are available to us, but water is the best choice. When we substitute other beverages for water, we are often ingesting extra calories without any additional nutrients. This is true especially of soda. Americans consume an inordinate amount of soda—equal to more than 25 percent of the total liquids consumed! Besides extra calories from added sugars, many sodas contain caffeine, which is an addictive drug.



**Figure 13.** Our bodies are about 60 percent water, so proper hydration is essential for maintaining good health.

Water transports nutrients, helps eliminate wastes, and is the main component of blood and other body fluids. Water facilitates chemical reactions throughout the body, is used in digestion, and helps regulate body temperature. The amount of water commonly recommended is eight 8-ounce glasses per day for a 2,000 calorie diet. However, government guidelines are higher—about 13 glasses per day for men and about 9 glasses per day for women. You need to drink even more water when you exercise vigorously and when the weather is hot.

Choosing what to drink is a major decision affecting your health. It is possible to refine your tastes so you enjoy drinking water! This is yet another area where you have an opportunity to demonstrate respect for yourself and enhance your overall well-being. (Good change!)

# DIETARY GUIDELINES

Experts from the United States and Canada create, revise, and distribute a framework of dietary guides called **Dietary Reference Intakes (DRI)**. The experts who develop the framework are concerned not only with health problems associated with nutritional deficiencies, but also with the increase of chronic diseases related to diet, such as heart disease, cancer, and osteoporosis. Specific DRI standards include the following:

- Estimated average requirement (EAR) and its standard deviation by age and gender.
- Recommended dietary allowance (RDA), based on the estimated average requirement and deviation.
- Adequate intake (AI) level, in cases where an RDA cannot be based on an EAR.
- Tolerable upper intake level (UL), above which risk of toxicity would increase.

These standards define the amount of each nutrient people should take to avoid nutritional deficiencies and reduce the risk of chronic disease. For example, according to the DRI, men and women aged 19–30 need 1,000 milligrams of calcium per day and 1.5 grams of sodium per day. Men should drink 3.7 liters of water each day and women should drink 2.7 liters each day.

The DRI are the basis for the primary tools given to Americans by the government to guide their nutritional decisions, including the Dietary Guidelines for Americans, published jointly by the U.S. Department of Health and Human Services (DHHS) and the U.S. Department of Agriculture (USDA). The USDA also publishes the food guide plate graphic to translate these recommendations into healthy food choices.

The USDA has also created the **Daily Values**, a simpler set of standards that focuses on nutrients of particular concern in the American diet, including cholesterol, carbohydrates, fats, fiber, and certain vitamins and minerals. The Daily Values are recommended amounts for a 2,000-calorie daily diet. These are the values found on food labels (*Figure 14*). In all, these tools are designed to help Americans choose foods and plan meals that contribute to a healthy diet.



**Figure 14.** The USDA standard Daily Values are listed on all food labels to focus attention on several key nutrients.

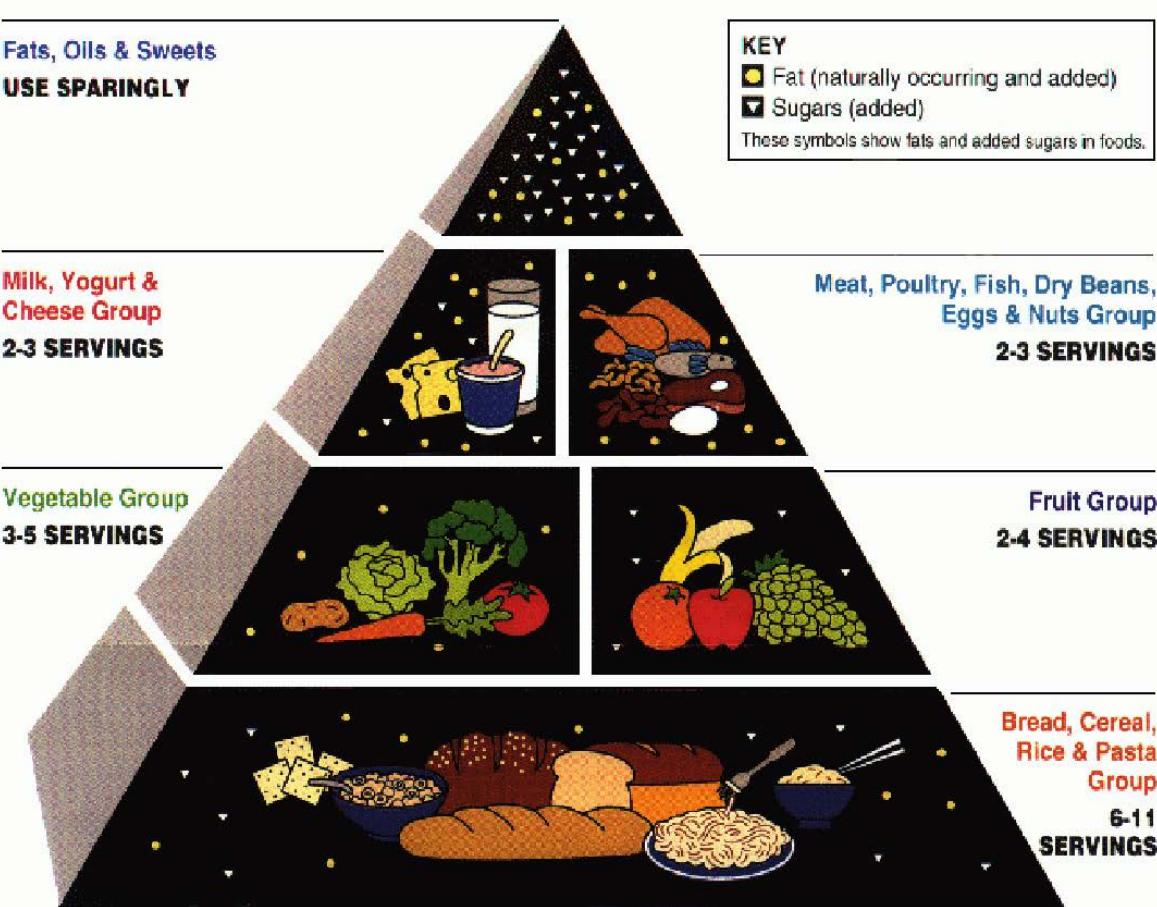
# U.S. Government Guidelines

The Dietary Guidelines for Americans are updated every five years. MyPlate and the nutrition facts label are designed to help people live according to the Dietary Guidelines. Rather than recommending specific foods to eat, the guidelines give broad recommendations, as follows:

- Balance your calories with physical activity to manage your weight.
- Consume more of certain foods and nutrients such as fruits, vegetables, whole grains, fat-free and low-fat dairy products, and seafood.
- Consume fewer foods with sodium (salt), saturated fats, trans fats, cholesterol, added sugars, and refined grains.

## MyPlate

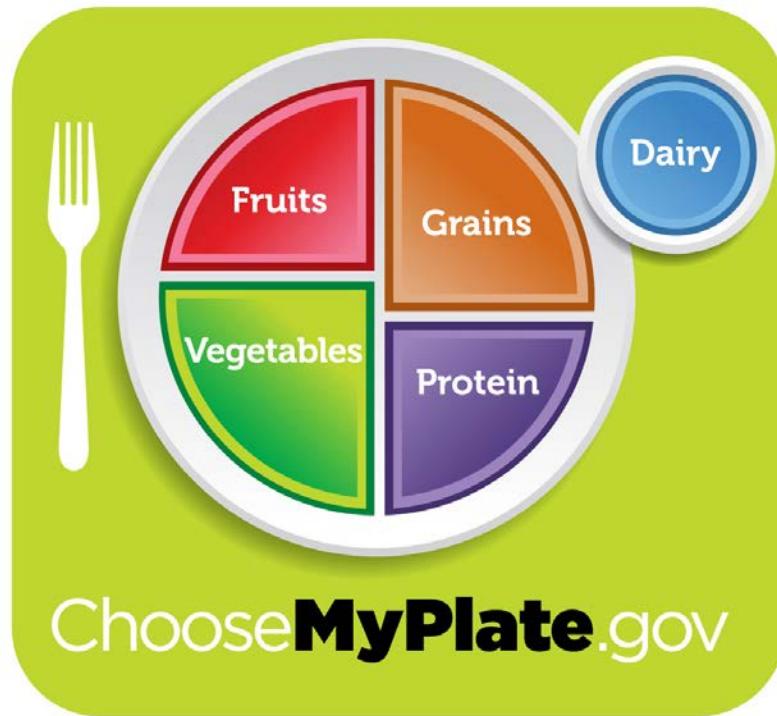
MyPlate is a nutrition guide made available by the USDA. This program is a departure from the formerly used food guide pyramids. The original Food Guide Pyramid, one of the most widely publicized nutrition tools in the country, was published by the USDA in 1992 and was revised several times over the following 13 years (*Figure 15*). The Food Guide Pyramid was based on food groups and recommended a range of daily servings for each group. Additional pyramids have also been developed based on similar principles but different food groups. In 2011, the USDA replaced the traditional Food Guide Pyramid with the MyPlate program.



**Figure 15.** The USDA first published its Food Guide Pyramid in 1992. The Food Guide Pyramid was used until 2011 when MyPlate was introduced.

The MyPlate graphic shows a plate divided into four food groups and a glass representing a fifth food group (*Figure 16*). The graphic suggests every meal should consist of about 30 percent grains, 30 percent vegetables, 20 percent fruit, 20 percent protein, and a small glass of dairy. MyPlate is a highly individualized approach, allowing people to make choices based on their gender, age, and activity level. As the program states, “One size doesn’t fit all.” MyPlate takes advantage of Internet technology to offer a personalized approach to healthy eating and physical activity. You can access the interactive website at [www.myplate.gov](http://www.myplate.gov).

The MyPlate website has detailed information on each of the five food groups, weight management and calories, and physical activity. It also has an app so you can plan your own eating based on the USDA guidelines. The website says the app can help you plan, analyze, and track your diet and physical activity. Additional tools include suggested daily food plans, calorie count chart, empty calories chart, solid fats chart, BMI calculator, and information on portions and food labeling.



*Figure 16.* The USDA introduced MyPlate in 2011 as a graphic guide to healthy, balanced meals.

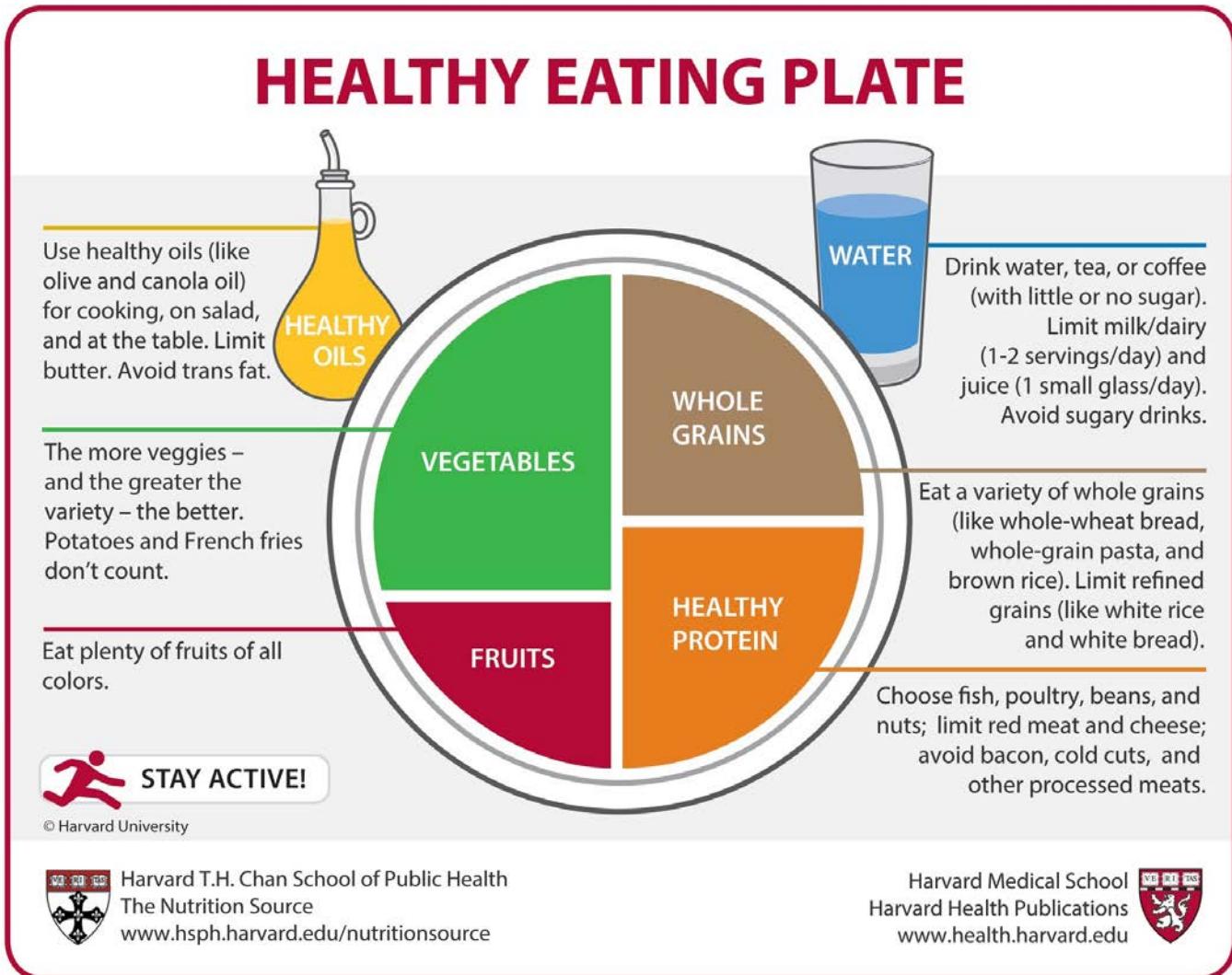
## Other Guidelines and Resources

Many nutrition experts take issue with the government-developed food guides, asserting that commercial interests are often in conflict with the latest scientific research in nutrition. Included here are a few examples of additional guidelines, pyramids, and recommended food groups that differ from those advocated by the USDA.

### Physicians Committee for Responsible Medicine

One advocacy group, the Physicians Committee for Responsible Medicine (PCRM), challenged the government recommendations and developed a food plan based on whole grains, fruits, vegetables, and legumes (including beans, peas, and soy products). The PCRM maintains that these four food groups provide all necessary nutrients, are very low in fat, and contain no cholesterol. According to the PCRM, people consuming a plant-based diet have a lower incidence of the chronic diseases that afflict Americans, including weight problems.

The Harvard School of Public Health nutrition experts developed the Healthy Eating Plate based on their scientific evidence linking diet and health (*Figure 17*).



**Figure 17.** Harvard Healthy Eating Plate. **Source:** Copyright © 2011, Harvard University. For more information about the Healthy Eating Plate, please see The Nutrition Source, Department of Nutrition, Harvard School of Public Health, [www.thenutritionsource.org](http://www.thenutritionsource.org), and Harvard Health Publications, [www.health.harvard.edu](http://www.health.harvard.edu).

According to the group's website, this plan "fixes fundamental flaws in the USDA MyPlate and offers sound information to help people make better choices about what to eat." Although the USDA has since resolved some of these issues, these nutrition experts objected to the MyPlate government dietary recommendations for a variety of reasons:

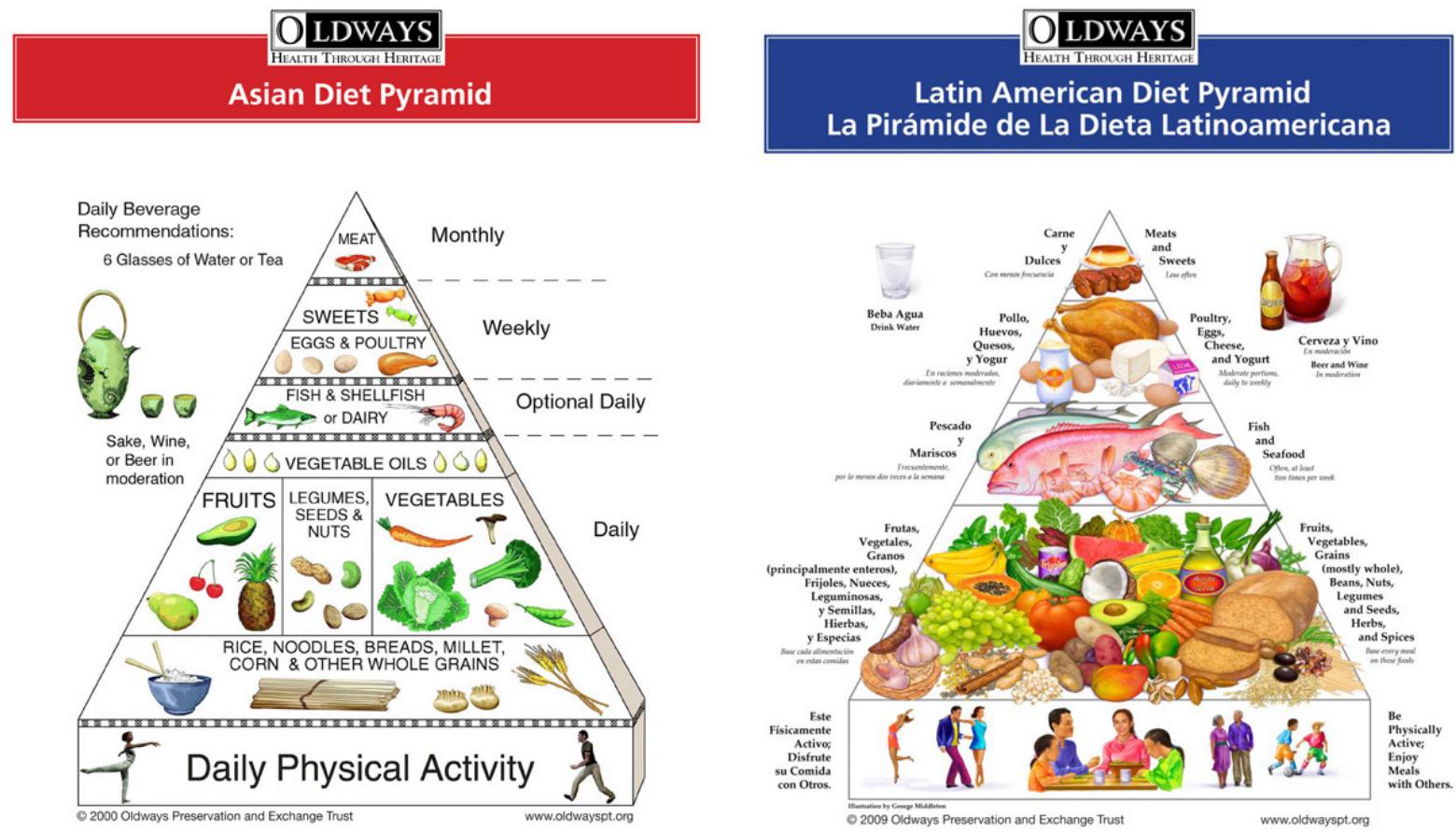
- They do not explain that whole grains are better for health.
- There is no warning that processed meats are harmful and that some high-protein foods are healthier than others.
- They do not distinguish between potatoes and other vegetables.
- They put fruits before vegetables.
- They say nothing about fats.
- They say nothing about physical activity.

Walter C. Willett, M.D., chairman of the Department of Nutrition at the Harvard School of Public Health and a professor of medicine at the Harvard Medical School, along with others at this school, have written a book titled *Eat, Drink, and Be Healthy* that explains the research behind and principles governing the Harvard Healthy Eating Pyramid. In the book, Dr. Willett lists "the seven healthiest changes you can make in your diet":

1. Watch your weight.
2. Eat fewer bad fats and more good fats.
3. Eat fewer refined-grain carbohydrates and more whole-grain carbohydrates.
4. Choose healthier sources of proteins.
5. Eat plenty of vegetables and fruits, but hold the potatoes.
6. If you use alcohol, do so in moderation.
7. Take a multivitamin for insurance.

## Oldways

Oldways is a non-profit educational and advocacy organization founded by K. Dun Gifford in 1988. It researches and promotes "harmonious traditional food patterns, sustainable agriculture, and healthy eating and drinking." The group is also the parent organization of two consumer education non-profits—the Whole Grains Council and the Latino Nutrition Coalition. On its website ([www.oldwayspt.org](http://www.oldwayspt.org)), Oldways presents several regional food pyramids, including a Mediterranean diet, a Latino diet, an African heritage diet, and an Asian diet (Figure 18).



**Figure 18.** Oldways diet pyramids for Latin American and Asian cultural diets. **Source:** Courtesy of Oldways ([oldwayspt.org](http://oldwayspt.org)).

These pyramids provide the opportunity to enjoy foods from many cultures while still following healthy nutritional guidelines. Oldways also presents a Vegetarian Diet Pyramid.

The large variety of eating plans available shows that not everyone agrees on exactly what constitutes the best healthy diet. But even though there are many food pyramids and eating plans, most of them agree on certain principles:

- Base your diet on whole grains, vegetables, and fruits.
- Limit the amount of saturated fat, trans fat, and cholesterol.
- Include healthy monounsaturated and polyunsaturated oils like olive and canola oils.
- Limit sugars and salt in your diet.
- Control the total number of calories you consume.
- Engage in regular physical activity.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Flexitarian Diet Experiment

Try this diet modification project. Eat primarily plant-based food for a minimum of four continuous weeks. Sometimes this is called a flexitarian diet or semi-vegetarian because you eat small amounts of meat including poultry or fish. Describe your nutrition experience in both qualitative and quantitative terms. Qualitative data might include things like how you feel, quality of sleep, level of stress, energy level, and feelings of contentment. Quantitative data might include things like body weight, typical meals, and changes you made in your nutrition. Make particular note of how you feel after a month compared to before.

## HEALTHY WEIGHT MAINTENANCE

Maintaining a healthy weight is one of the most important factors contributing to good health over your lifetime. In the remainder of this chapter, we consider the connection between food and energy production, and how this relationship affects weight management.

### Maintaining an Energy Balance

The energy you get from food is measured in calories. A **calorie** is the amount of heat it takes to raise the temperature of one liter of water from 14.5° C to 15.5° C. Carbohydrates and proteins provide about 4

calories per gram, and fat about 9 calories per gram. Although recent research has tried to differentiate between the effect of carbohydrate, protein, and fat calories on the body, this research has been done under well-controlled laboratory conditions and cannot be generalized to normal living situations. For the purposes of our energy balance discussion, we will assume that a calorie is a calorie, regardless of what type of food it comes from.

Up until recently, we thought the key to maintaining a healthy weight was to burn or expend the same number of calories as you consume—that is, to maintain an energy balance. An exception to this rule is that foods with a high glycemic index have a different effect on the body than whole foods, as discussed earlier—they produce a spike in blood glucose levels and an instability in the production and use of insulin, causing more glucose to be stored as fat. You can also disrupt your body's energy balance if you restrict the number of nutrients you consume by dieting. In this case, your body may protect itself by lowering its **metabolic rate**—the rate at which it uses the food energy consumed. The more active you are, the higher your metabolic rate. To manage your weight, you need to consider both the food you consume and the activity you do to expend the food energy taken in.

## Three Energy Systems

Your body uses food to either build body tissues or to produce energy. Regardless of whether a food is a carbohydrate, protein, or fat, it must be converted into **glucose** (blood sugar) to provide the body with usable energy. During digestion, most carbohydrates are converted directly into glucose. Some of the glucose goes into the bloodstream for quick energy, and some is stored in the liver, kidneys, or muscles as glycogen. If these glycogen stores are full, the remaining glucose is converted to body fat and stored in fatty tissues. Although protein is used primarily to build tissue, it can also be stored as fat and used for energy after other energy fuels are used. Dietary fat is also stored as body fat and used for energy.

### Adenosine Triphosphate Energy System

Glucose, glycogen, and fat are used to form a chemical compound in cells called adenosine triphosphate (ATP). When a cell needs energy, it breaks down ATP, a process that releases energy. There are three ways in which the body produces and uses ATP. The first, called the immediate energy system, uses the small amount of ATP stored in cells to provide very short bursts of energy lasting about 10 seconds. This system is called into play for actions like standing up from a chair or running to answer a knock on the door. In this system, the ATP is broken down into adenosine diphosphate (ADP), and then creatine phosphate (CP) is utilized to regenerate ADP into ATP for more energy. This whole process happens in seconds.

### Anaerobic Energy System

The second energy system uses glucose and stores of **glycogen** and fat to produce energy in the absence of oxygen; thus, it is called the anaerobic (“without oxygen”) energy system. This system is called on for activities needing short bursts of energy, such as sprinting, weight lifting, or playing stop-and-start sports like tennis (*Figure 19*). These activities feel intense, usually last only 1 to 3 minutes, and cause you to get out of breath. About 60–70 percent of the fuel for anaerobic activities comes from carbohydrates (glucose and glycogen stores), and about 30–40 percent comes from fat, both of which are converted to ATP in cells. These activities cannot be sustained for long because they use up the body’s glycogen stores and produce lactic acid faster than the body can buffer it.



**Figure 19.** Short sprints are an activity that uses the anaerobic energy system.

## Aerobic Energy System

The third system uses glucose, glycogen, fat, and in some circumstances protein, to produce energy in the presence of oxygen. This is called the aerobic energy system. Aerobic activities are steady state or continuous activities like walking, jogging, and swimming (**Figure 20**). These activities feel like moderate intensity, may last an hour or more, and do not cause you to get out of breath. About 40–50 percent of the fuel for aerobic activities comes from carbohydrates and 50–60 percent comes from fat.

Fats burn during exercise when glucose and glycogen stores have been depleted, and during low-intensity activity of long duration including rest and light activity. So fat burning, also known as aerobic lipolysis, is the slowest of the energy systems. If you are out of shape, nearly any activity you do burns more carbohydrates than fat. As you become fit you work more efficiently and begin to draw on your energy reserves, about 70 percent of which are fat. Thus, the more fit you are, the more fat you burn.

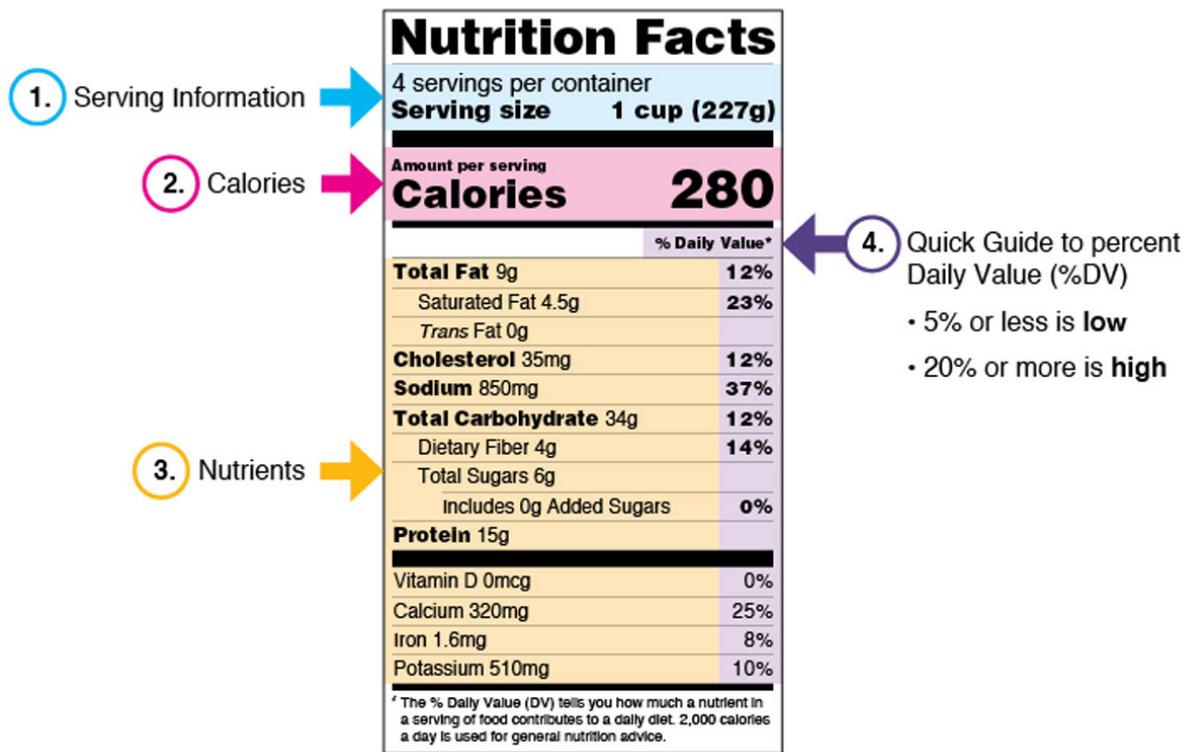
In summary, maintaining an energy balance—weighing calories in against calories out—is a key to healthy eating and weight management, but it is more complex than it seems. When you do not over-consume calories every day from protein, “good fats,” and “good carbs,” your body effectively uses these nutrients and they do not add to body fat stores. Once you do have stored body fat, it is hard to shed, because it is the last and slowest-burning energy source to be utilized during exercise and physical activity. This is yet another reason to be aware of the completeness of your whole being and the full impact of your choices—both short term and long term—when it comes to eating.



**Figure 20.** Swimming is a form of aerobic exercise.

# FOOD LABELS FOR WISE CHOICES

Labels are required on most packaged foods, as required by the U.S. Food and Drug Administration (FDA) and the Food Safety and Inspection Service of the USDA. Each label follows a standardized format, with “Nutrition Facts” printed in bold across the top (*Figure 21*). The order in which the information appears corresponds to concerns about the health of Americans. The diet of many Americans—that is, their overall pattern of food intake—is too high in saturated fat, cholesterol, sodium, and sugar, and too low in dietary fiber.



**Figure 21.** The nutrition label lists the amount of several specific nutrients in one serving of that food item. Source: [www.fda.gov](http://www.fda.gov)

## Serving Size

To choose a healthy diet, you need to be able to read and understand food labels. Be especially aware of the first facts listed—the serving size and servings per container. Many people assume that the nutritional information applies to the entire content of the package, but often the information is for just one serving. Also note that what the manufacturer states is a single serving may be significantly smaller than what the average person typically consumes in one sitting. If a package contains two servings and you eat the whole package, you should double each of the specific nutrition facts to find out what you have consumed. Noticing the number of servings per container may have quite an effect on how much of the package contents you eat.

## Amount Per Serving

Listed next, under Amount per Serving, are the number of calories and the number of calories from fat (*Figure 22*). Remember, this is per serving! Aside from the total calories, you can also tell whether the food is high or low in fat. To find out what percentage of the calories in this food comes from fat, divide the calories from fat by the total calories. For example, if the food has 250 calories per serving and 200 of them come from fat, you know it is a high-fat food ( $200/250 = 80$  percent). Government guidelines recommend that you consume 20–35 percent of your daily calories from fat, aiming for 30 percent overall.



**Figure 22.** Check the nutrition label for the serving size of the food you are about to eat. Listed next, under Amount per Serving, is the number of calories.

## Nutrients List

Next, the label lists the amount of specific nutrients in this food, such as fat, cholesterol, sodium, carbohydrate, protein, and four vitamins and minerals, as well as the percentage of the Daily Value for each nutrient based on a 2,000-calorie per day diet. Consumers are advised to limit their consumption of total fat, saturated fat, trans fat, cholesterol, and sodium, and to get enough dietary fiber, vitamin A, vitamin C, calcium, and iron. If a food is fortified with optional components, or if a claim is made about optional components, these components must also be listed on the label. At the bottom of the label are the recommended daily intakes for several of the nutrients based on a 2,000-calorie and a 2,500-calorie per day diet. This last part of the food label is the same on all labels, regardless of the product.

## Daily Value

The percentage of Daily Value is given so the consumer has some context for the nutrient amount. For example, a food containing 100 milligrams of sodium might seem to be high in sodium when considered out of context. The Daily Value for sodium, however, is 2,400 milligrams, so a food with 100 milligrams would have less than 5 percent of the Daily Value and would be quite low in sodium.

What does it mean when you see claims like “low cholesterol” or “high in fiber” on a food label? Food manufacturers are required to meet certain standards to use these terms. However, you still need to be aware of the message being given.

For example, a label may read a product is free of trans fat. The guideline for producers is that for them to be able to label a food as “trans fat-free” it must not contain more than 0.5 grams of trans fat. Say this item is a cookie. If you eat four cookies, you may have consumed 2 grams of trans fat even though the label claims the cookies to be free of trans fat. They can label the cookies as free of trans fats because one cookie (one serving) contains less than 0.5 grams of trans fats.

Food labels are designed to give you accessible, accurate information about the food you buy and to help you make wise decisions (*Figure 22*). They can be especially helpful when you are comparing and selecting products in the store. Once you get used to reading food labels carefully, you won’t want to shop without them!



**Figure 22.** A good habit to develop is reading food labels so you can make healthy food choices.

## MOVING FORWARD

Having completed this chapter, expected outcomes include

1. As you select the foods you will eat, your first consideration will be the nutritional value of that food.
2. The foundational knowledge you have will prepare you to continue refining your understanding of what foods are best for you to consume.
3. Recognize that your day-to-day good food choices will provide you with long-term good health. The opposite is also true. The time to start eating well is now.
4. Use your knowledge to be a wise consumer—read food labels.
5. Establish a comfortable environment for as many meals as possible. Do your best to be calm and not stressed or in a rush when you eat.
6. Enjoy good eating and derive the pleasures meant to be experienced.

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# GLOSSARY TERMS

**Antioxidants:** Substances that can combine with or neutralize free radicals and prevent oxidative damage to cells and tissues.

**Calorie:** A measure of the energy value of a food.

**Carbohydrate:** Starches (digestible) and fibers (indigestible) that serve as the body's primary source of energy.

**Daily Values:** A set of nutrient standards used as a reference on food labels.

**Diet:** An overall pattern of food intake; not to be confused with dieting, which is an unsafe and unbalanced way of restricting food intake for weight reduction.

**Dietary fiber:** An indigestible carbohydrate found in plants.

**Dietary Reference Intakes (DRI):** A set of nutrient standards designed to prevent nutritional deficiencies and reduce the risk of chronic disease.

**Digestion:** The process by which large food molecules are broken down into smaller molecules that can be absorbed in the intestinal tract.

**Essential amino acids:** The amino acids that your body cannot make and must come from the food that you eat.

**Fatty acid:** An organic acid with a hydrocarbon chain; a part of most fat molecules.

**Free radicals:** Short-lived chemicals that can have detrimental effects on cells.

**Glucose:** The most important simple sugar, or monosaccharide, circulating in the blood; "blood sugar."

**Glycogen:** Complex carbohydrate stored primarily in the liver and muscles; converted to glucose when energy is needed.

**Hydrogenation:** The process of adding hydrogen atoms to polyunsaturated vegetable oils to make them more solid for use in margarine or shortening; prolongs product shelf life and improves texture.

**Legumes:** Beans and peas, such as pinto beans, navy beans, kidney beans, split peas, lentils, and soybeans.

**Macronutrients:** Nutrients needed in the body in relatively large amounts.

**Metabolic rate:** A measure of energy use by the body.

**Metabolism:** All of the chemical reactions that take place in the body.

**Micronutrients:** Nutrients needed in the body in very small amounts; vitamins and minerals.

**Minerals:** Inorganic nutrients that regulate many chemical reactions in the body.

**Monounsaturated fatty acid:** A fatty acid provided in the diet by olive oil and canola oil, among others; chemically, it has one double bond between carbon atoms.

**Nutrients:** Substances in food necessary for sustaining life via growth, repair, and maintenance of cells, and for providing energy.

**Omega-3 fatty acid:** A type of polyunsaturated fatty acid that is essential in the diet; found in fish and monounsaturated vegetable oils; appears to be beneficial for cardiovascular health.

**Omega-6 fatty acid:** A type of polyunsaturated fatty acid that is essential in the diet; found in polyunsaturated vegetable oils.

**Osteoporosis:** A chronic disease characterized by porous bones; influenced by calcium intake, hormones, activity levels, and genetics.

**Polyunsaturated fatty acid:** A fatty acid provided in the diet by soy and corn oils, among others; chemically, it has two or more double bonds between carbon atoms.

**Protein:** Organic compounds composed of amino acids and peptides; the principal component of bone and muscle.

**Saturated fatty acid:** A dietary fat found primarily in foods of animal origin; chemically, contains no double bonds in the carbon chain, so it is "saturated" with hydrogen atoms.

**Starches:** Complex carbohydrates; long chains of glucose molecules.

**Trans fat:** A fatty acid with an unusual chemical structure; created when vegetable oils are hydrogenated.

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Individual and Family Recreation

# What Brings Me Joy?

Wholesome recreational activities are a part of the individual and family lives of millions of people. What a fun way to stay healthy! If we think that **physical activity** is just about the body, forgetting the wholeness of our being, it is so easy to get caught up in the thinking that being fit is work rather than fun. Why make it an either/or choice?

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Of course, being physically active takes effort and what some may think of as work, but why not make that work fun? There are so many varieties of activities to enjoy—there must be some activities that you can incorporate as some of the pleasurable aspects of your life. When you find the right match for you, it becomes a part of your life that you just can't wait to do. Physically active leisure time is also a great avenue for family time that all can look forward to doing together.



## After reading this chapter, you will be able to:

- › **EXPLAIN** how recreational activities benefit your wellness.
- › **USE** the Physical Activity Pyramid as a guide to creating a physically active lifestyle.
- › **DESCRIBE** how to apply the F.I.T.T. principle to recreational activities.
- › **IDENTIFY** strategies and tactics for being a prudent consumer of fitness equipment and services.
- › **EXPLORE** recreational activities that you will enjoy doing for a lifetime.



**Figure 1.** This may be the best time to begin new leisure activities.

## What Brings Me Joy?

individual and family recreation

### BENEFITS OF RECREATIONAL ACTIVITIES

Even though you will need to plan your time well, while you are in school is a great time to learn and improve sports and fitness skills you can enjoy. Classes, intramurals, extramurals, or clubs are readily available. It certainly is a cost-effective way to establish a physically active lifestyle. The younger you do this, the more apt you are to continue your commitment to living a healthy lifestyle. It may be hard for you to imagine now as a student, but in the coming years there will be additional demands on your time that will challenge this commitment. The fitness and wellness levels you attain now will benefit you over a lifetime. The joy you experience will attest to the wholeness of your being. As discussed in earlier chapters, physical activity certainly contributes to your health, but overall what you will notice is the great quality of life you will enjoy (*Figure 1*).

Healthy People 2030 calls once again for Americans to increase their leisure-time physical activity. A prudent lifestyle is a healthy lifestyle in which you are physically active enough to realize or maximize health benefits. It may take a bit more effort for some people to discover the fun of being physically active compared to the fun of sitting and playing computer games. However, leisure activities help you to be wise in your healthy choices because they can also be so much fun. Again, it is not a matter of either/or, it's just a matter of exercising your prudence to find some physically active leisure that you enjoy as well.

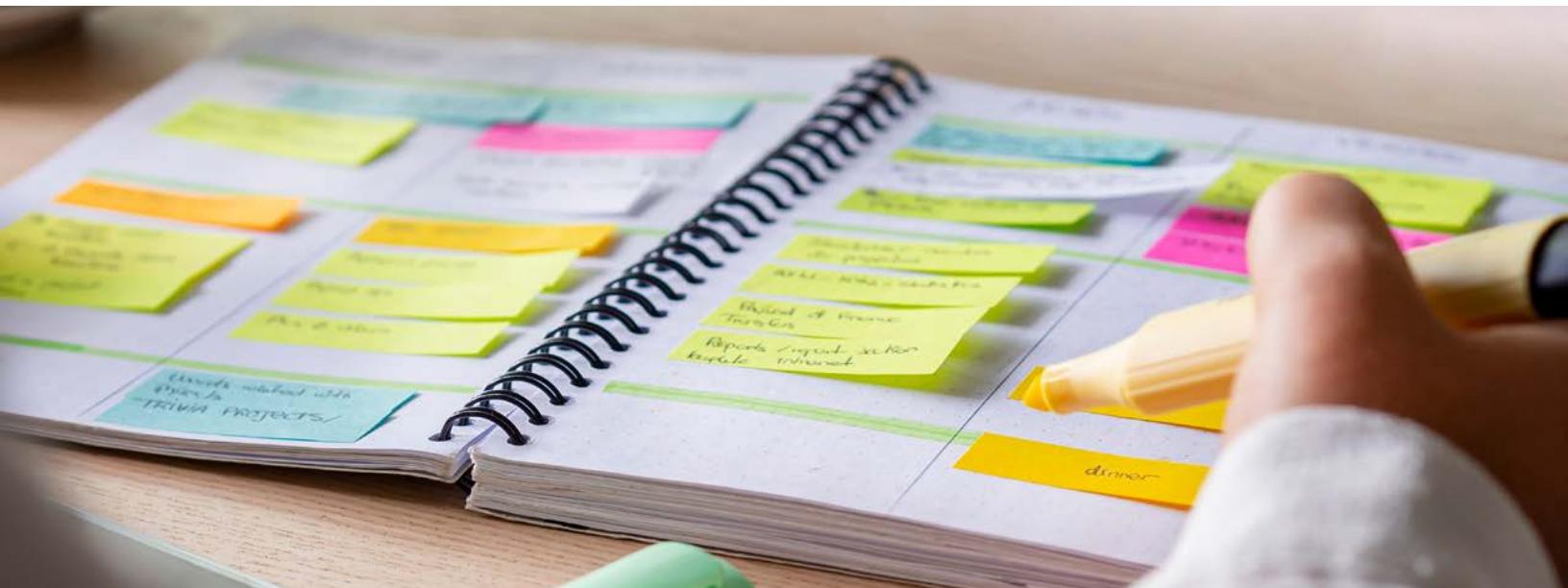
# Common Barriers to Being Active

Common reasons people give for not being active include

- Not having enough time
- Finding it inconvenient
- Lacking self-motivation
- Not enjoying exercise or thinking it is boring
- Lack confidence in their ability to be physically active and fear of being embarrassed

Most often if someone is not active they say it is because they do not have time. Of course, each one of us has the same 24/7 with which to work, so the real reason is not taking the time rather than not having the time (*Figure 2*). Some believe they can't find the fun in physical activity. If a specific activity isn't fun for someone, it certainly makes sense not to do it. What doesn't make sense is that out of all the possible choices, there is nothing that is fun to do. If a person can just be motivated enough to want to find something physically active that is fun for him or her, surely it is out there.

Expense should not be a barrier either. Each of us could spend lots of time and money on sports activities, but that's really not necessary. We should also not be afraid to try new activities. If a person does not have the skills for a certain activity they are interested in, there is no time like the present to practice and learn. Environmental factors can be a real challenge, but they are usually not impossible to overcome. That said, safety has to be a consideration and top priority.



**Figure 2.** We are all busy, but we must take the time for physical activity.

# Common Reasons for Being Active

What are the reasons people give for being active? Whether true or not, most say they are active so they can enjoy health and wellness. This is certainly a reasonable answer, because who wants the opposite? Actually, most people are active because it really is an enjoyable part of their lives. It feels good to get outside, to move, to be healthy. It feels good to have strength, and to look good with muscles. It feels good to accomplish a task, to meet a challenge. It feels good to move rhythmically, to move to music. It feels good to go fast, whether self-propelled or via a snowmobile or boat. It feels good to float, to be buoyed up by water, to surf.

# Physical Activity Improves Mood

A study presented at the American College of Sports Medicine (ACSM) annual conference demonstrated that the improved mood that comes with exercise is long lasting. For years, studies have demonstrated that moderate physical activity improves mood, but this study indicated that the improved mood lasted for 12 hours (*Figure 3*). Dr. Jeremy Sibold, a professor at the University of Vermont, discovered that after 24 college students each rode a stationary bicycle at moderate intensity for only 20 minutes, they experienced significant improvement in mood immediately after the exercise, but they also had improved moods after 2, 4, 8, and 12 hours compared with those who didn't exercise.



**Figure 3.** What physical activities bring a smile to your face?

## Physical Activity Helps You Relax

Physical activity is also cathartic, meaning it is relaxing, a break from the ordinary, therapeutic. A major reason people seek to be active is to experience this catharsis, the release from tension that builds from doing homework, going to classes, meeting the requirements and expectations imposed by school and work. What a great way to meet this need as opposed to those things that have negative health effects, are illegal, or both.

Also, many people choose to be physically active because of the social benefits. It is not only a great way to meet other people, but to enjoy time together. It is also why people continue to be active. When you know your whole family is involved or you run or walk with friends, you have a team counting on you, and the association with others is often as satisfying as the activity itself.

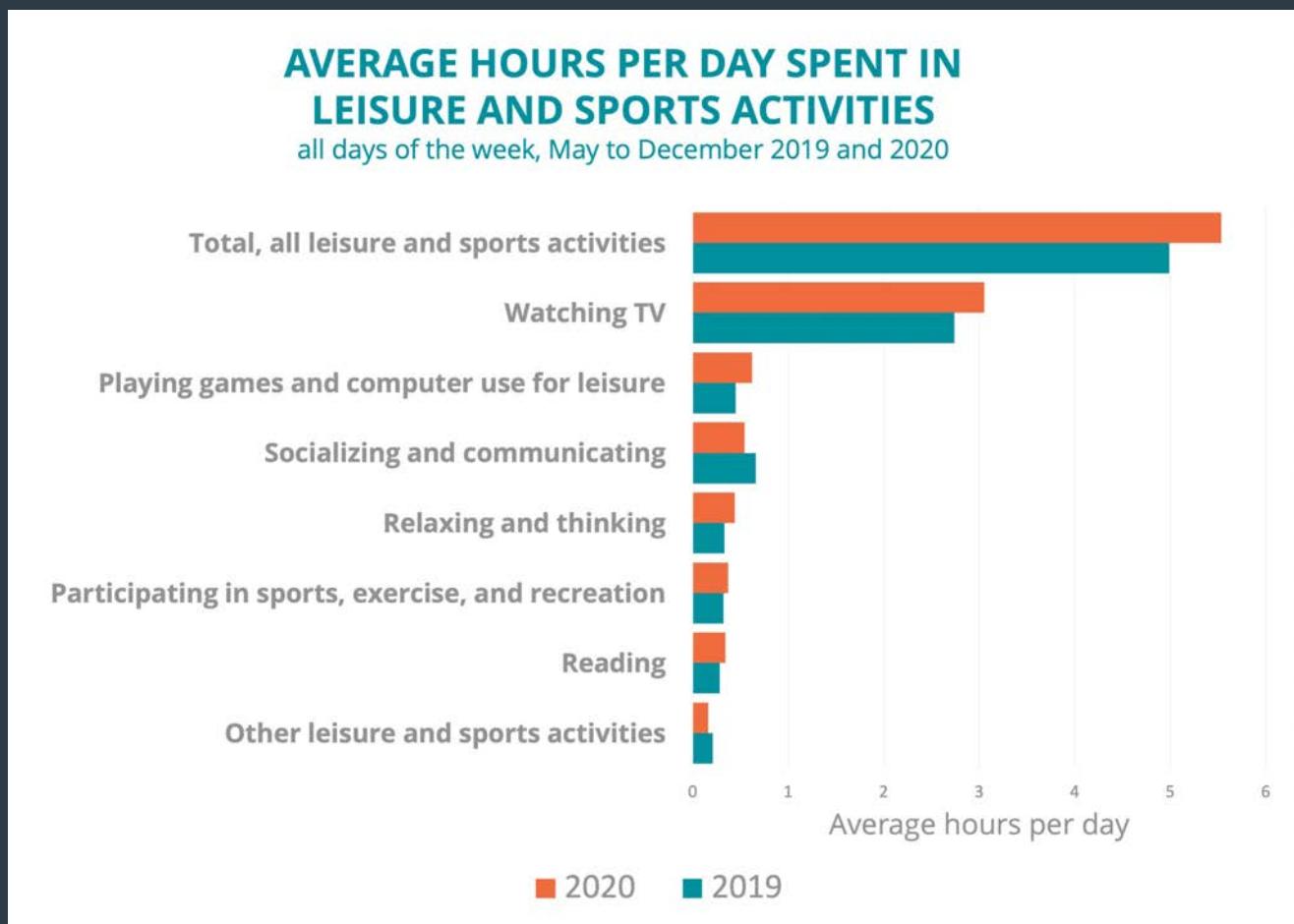
## Physical Activity Improves Your Health

The chances of sustaining a physically active lifestyle over the years are enhanced if you find activities that you really like and that bring you joy. Doing the activities solely for health reasons usually results in the person not staying with them as life gets more complex. Without the enjoyment, the health motivation alone often gets pushed aside or way down the priority scale unless a person has a real health scare—then it becomes important again. However, when you enjoy your physically active leisure time, you realize it is a pretty good deal that you can spend hours having a great time and receiving all these health benefits in addition.

Leisure activities can help you to improve your cardiorespiratory endurance, muscular strength and endurance, flexibility, and body composition. For the greatest health benefits, physical activity should be moderate to vigorous.

# How We Spend Our Leisure Time

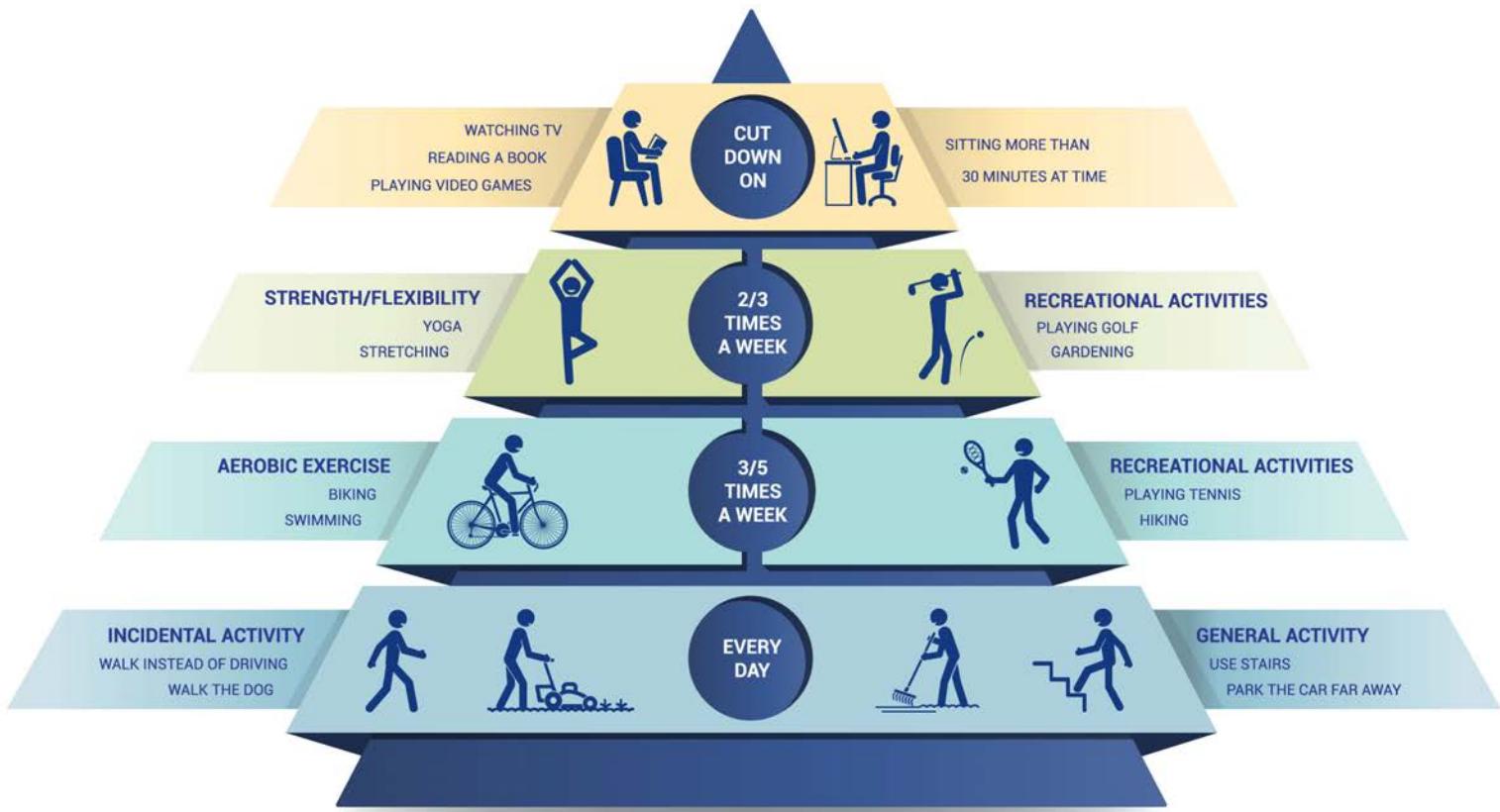
We each choose how to spend our leisure time, whether we realize we are making an active decision or not. *Figure 4* shows the decisions Americans make every day on how to spend their time when they are not working, studying, or sleeping. Note the activity most chosen: watching television. Playing video games and on the computer is also on the rise and comprises more time than any physical activity. While we may get temporary enjoyment from these easy activities, they can never have the lasting benefits of being physically active.



**Figure 4.** Leisure-time activities chosen by Americans from 2019 to 2020.  
Source: U.S. Bureau of Labor Statistics

# THE PHYSICAL ACTIVITY PYRAMID

The physical activity pyramid shown in *Figure 5*, parallels the former U.S. Department of Agriculture (USDA) food guide pyramid. It gives the recommended amounts and types of physical activity according to the F.I.T.T. principles—frequency, intensity, time, and type (see the cardiorespiratory chapter to learn more about F.I.T.T. principles). The physical activity pyramid has four levels.



**Figure 5.** The Physical Activity Pyramid has four levels of activities ranging from everyday activities to those recommended a few times per week.

## Level 1: Physical Activity Every Day

Level 1 of the pyramid contains those activities that have health and wellness benefits for the greatest number of people. If everyone would simply do the lifetime physical activities of the pyramid's first level for the recommended 30 minutes per day, the health of our nation would improve significantly. Even though they require minimal movement, these lifetime physical activities such as climbing the stairs, doing yard work, walking, bowling, fishing, or playing golf are enough to improve fitness, health, and the quality of one's life.

## Level 2: Physical Activity 2–3 Times a Week

Level 2 of the pyramid describes more vigorous aerobic sports, such as jogging, biking, aerobic dance, basketball, tennis, and racquetball. This level also includes recreational activities like hiking, backpacking, skiing, and rock climbing. Health benefits from these more vigorous activities will be experienced with only 20 minutes of activity 3–6 days per week. These activities are good for developing cardiorespiratory fitness and maintaining a healthy weight. Most people will be able to enjoy these activities into their later years.

## Level 3: Exercise for Muscle Health and Flexibility

Level 3 of the pyramid emphasizes exercise for flexibility, strength, and muscular endurance. These exercises are included in the pyramid because flexibility and strength may not be developed adequately by the Level 1 and 2 activities. These are important aspects of exercise that can be enjoyed while doing them only 2–3 times a week.

## Level 4: Rest and Inactive Time

The top of the pyramid represents time off—the time needed to rest and recover each day. This level also represents inactivity and reminds us to avoid long periods of being sedentary. Everyone needs time to relax, but the rest or inactivity represented by the top of the pyramid can become the greatest obstacle for most people to overcome. Watching television, playing video games, and other forms of sedentary entertainment occupy hours and hours for some. These activities can become addictive in nature and consume significant time before an individual even realizes all the time they have spent at it. Good study habits are neglected or never formed, relationships can be impaired, and the time not spent in physically active leisure will take a toll in not getting the benefits each of us needs. Truly this is an area in which people squander their time and, as a result, squander their precious lives. When choosing restful activities, choose those that are more productive, or those that allow you to still spend time with family and friends (*Figure 6*).



**Figure 6.** A good balance of different activities and activity levels includes time for rest—perhaps reading a good book or playing a card game with your friends.

The developers of the pyramid were thinking in terms of leisure-time rest rather than the sleep required at night. Your most important rest and recovery come with a good night's sleep. Unfortunately, there is probably little that will ever change the cultural norm that sleep is antithetical to college life. You can make such a difference for good if you will find a way to get a good 7–8 hours of sleep each night. Many of the health benefits resulting from a good night's sleep have been discussed throughout this course.

## Choosing a Variety of Activities

The pyramid is an excellent guide because it encourages you to find several activities you enjoy, keeping this component of your life much more interesting. Find activities you like to do in each of the four levels. Strike a balance using the different levels to guide your choices. At this point in your life, one level—such as Level 2, for example—might be the most appealing, so the tendency would be to have all your leisure time spent just in one or more of the Level 2 activities. To live the healthiest life and meet the needs of the entire mindbody, you need activities from each level.

Another point in getting variety in your activities now is so you will have a number of skills and interests in your future. Basketball may be the most fun now, but if it is all you are interested in, what about activities you will share in your future relationships? Start now to learn activities you can enjoy with those people who you will spend your time with later in your life.

## F.I.T.T. PRINCIPLES FOR RECREATIONAL ACTIVITIES

Attention to the frequency, intensity, time, and type (F.I.T.T.) of activity in which you engage gives more direction than just the activities' contribution to fitness and wellness. For instance, one of the obstacles to continued participation is the tendency to overdo it at the start of a fitness or physical activity program.

Starting out too fast or too intensely may result in injury or soreness that hinders further activity. Go at your own pace and don't be driven by what others around you are doing (*Figure 7*). There is no need to compete with others, and there certainly is no contest as to the amount of activity you can do. Find someone with similar skills or fitness level, or at least someone who is respectful of yours. It is wonderful to be highly motivated to get started, but pace yourself to avoid problems.



**Figure 7.** You should always proceed at your own pace when learning a new physical activity, whether it is taking an exercise class, walking for fitness, or playing a sport.

# Frequency

The frequency or how often the activity is recommended depends on the level. The physical activities at the bottom of the pyramid are to be done all or most days of the week; this is why they are called lifetime. You can make your regular daily living more physically active by increasing your awareness. Walk up the stairs rather than taking the escalator, park your car farther away from your destination, walk to class or to the store when you are able, help your community by picking up trash.

Weight training or resistance exercise needs to be done twice a week. If you desire, you could add a third day each week. With weight training you need a rest day between sessions to rest your muscles, so you have enough intensity when you do work out. Be sure to take time to make weight training a normal part of your life. Women, as much as men, can enjoy the muscle firmness, the strength of core muscles, and the good appearance that comes with muscular strength and endurance.

# Periodicity

One of the most popular fitness trends is **periodicity** or non-continuous exercise as opposed to continuous or steady-state exercise. National guidelines for physical activity since 1995 have encouraged an accumulation of 30 minutes of activity daily. The message is that you do not need to sustain aerobic activity for a certain length of time to derive the health benefits. Breaking the activity into smaller segments of time is just as effective as completing the activity all at once—that is, you can accumulate 30 minutes throughout the day rather than having to do the activity in a single sustained block of 30 minutes.

**Interval training** has been the training method of choice for elite athletes for many decades. The point of interval training is to push the body into oxygen debt, which is accomplished by doing short bouts of exercise at a very high intensity (*Figure 8*). Minimal rest is taken before the athlete pushes herself or himself into another interval of high intensity. A runner may sprint for 100 meters as fast as possible, rest for 10 seconds, and sprint another 100 meters. This interval pattern could be done 10 times for one set. After the first set, a longer rest is taken and then the runner does another set of 10 intervals. This type of training is the most effective for building one's maximal oxygen carrying capacity. Because of the intensity of this training, it is very important not to do this if you have high blood pressure or any heart condition. People with any medical problems should consult a physician and be under supervision before embarking on a program of this intensity.



**Figure 8.** Interval training—a short bout of high-intensity exercise followed by a rest period—is a good way to get in your daily 30 minutes of exercise in multiple shorter segments.

A study conducted by Dr. Jason Talanian was done on eight women in their early 20s. It showed that interval training enhances the body's ability to burn fat. The women rode stationary bicycles at 90 percent capacity for 4 minutes and were then given a 2-minute rest; they repeated this 10 times. Over a 2-week period they did seven of these sessions. When compared with the results from 1 hour of continuous moderate cycling, which they did prior to the interval training, the amount of fat burned during the interval workouts increased by 36 percent.

There are many forms of non-continuous exercise because any length of interval or intermittent exercise and rest can be beneficial. If you are working at a desk job and can take a break and climb some stairs for 10 minutes before returning to your desk, you are doing a form of periodicity training. Repeating that three times gives you your accumulated 30 minutes of activity for the day. That's pretty simple—no special equipment, no expense, no inconvenience. It's a good start to being active that will prepare you to do some sports or recreational activities that are more fun.

## Intensity

What makes interval training or intermittent exercise and rest so effective is the higher intensity. Some have the misconception that a lower level of activity intensity burns fat more efficiently. But actually, more benefits accompany greater intensity. Another mistaken notion is that at lower intensity there are no fitness benefits. That is not true. Low-level and moderate activity contribute significantly to fitness, particularly for those who are at a beginning level. When you take part in your physical activity, make it as intense as possible to derive the greatest health benefits (*Figure 9*). This means that you start easy and discern the level of intensity of which you are capable. Give yourself longer rest intervals at first. A rest interval in which you bring your pulse near a resting level does not rob you of the health benefits. You do not need to push yourself into oxygen debt if you are interested in healthy living rather than elite performance.



**Figure 9.** You will reap the most benefits from making your activities as intense as possible.

Another measure of intensity is the measure of the metabolic cost of an activity. Scientists use the **metabolic equivalent of task (MET)** for this measure. A MET represents the body's resting metabolic rate—the energy required by the body at rest. *Table 1* gives the METs for low intensity (less than 3–4 METs), moderate intensity (6–8 METs), and vigorous intensity activities (more than 10 METs). METs are approximate measures that vary with an individual's effort, skill, and motivation. You may see this term used in charts in fitness centers or fitness-related literature.

**Table 1. Various Physical Activities and Energy Consumed in METs**

Activity	METs per Hour
Walking slowly, less than 2 mph	2.0
Gardening, light	2.0
General house cleaning	3.0
Walking briskly, 3 mph	3.3
Heavy yard work or gardening	4.0
Climbing stairs	4.0
Bicycling, casual, less than 10 mph	4.0
Dancing (ballet or modern)	4.8
Snorkeling	5.0
Mowing the lawn with hand mower	5.5–6.0
Shoveling snow	6.0
Strenuous hiking	6.0–7.0
Rowing or kayaking	6.0–8.0
Skiing, downhill	6.0–8.0
Bicycling, 10–16 mph	6.0–10.0
Aerobic calisthenics	6.0–10.0
Singles tennis	7.0–12.0
Swimming, crawl, slow	8.0
Running, 8 mph	13.5

**Source:** Harvard Medical School, [www.health.harvard.edu](http://www.health.harvard.edu).

# Time

Try to make your physically active lifestyle a part of your normal routine. Plan time each day for the activities you choose. Keep it simple so it is the least disruptive yet some of the most enjoyable time of your day. It certainly isn't time lost. You will find that your work time and family or personal relationships are far more meaningful when you are in good shape physically, mentally, and emotionally. Your physical activity time is valuable time—a valuable investment.

Make this time as enjoyable and convenient as possible so you will look forward to it and not grow to resent it. Keep the amount of time being physically active in perspective so that others close to you don't resent the time you are spending away from them. Where possible, do the activities with others to strengthen your relationships. As you are respectful of yourself and of others, a physically active lifestyle will be the norm for you throughout your life.

## Type of Activity

There are so many activities from which to choose, and your options will forever continue to grow. Basing your choice of activity on some artificial measure for fitness or health will probably yield the least satisfactory results. Have fun—find something you really enjoy doing. As we have discussed in previous chapters, the positive feelings you have will themselves significantly contribute to your health. And if you are like most people, you are not going to keep doing something you do not enjoy, even if it is good for you.

The social aspects and benefits of activity also contribute greatly to your health. You may choose an activity just because your friends or family take part in it, but eventually it becomes the activity that you prefer as well. Quality of life is better as we engage in physical activities we can enjoy with others. Making physically active leisure a top priority is a smart investment in your relationships and health (*Figure 10*).



**Figure 10.** Choose activities you can share with others to build your relationships along with your health.

Later in the chapter, we examine activities that are growing in popularity. You may find that activities you had never considered are really fun. Why confine your choices to only those you have done before? Be adventurous; try something new.

To find the physically active leisure experiences that you really enjoy, look at your preferences. Do you like to be outdoors or in a gym? Do you like solo activities or do you prefer playing competitive sports? Maybe you have interests in many areas and would like to just try something that puts you in a different environment for a while.. The main thing is to not limit your choices. Experiment, explore, and look for activities that feel really good to you. It is a lot like having different tastes in music. How do your leisure-time activities harmonize with the rest of your life?

## SPEND WISELY ON FITNESS

Billions of dollars are spent each year on leisure-time pursuits, such as home fitness equipment, health clubs, and spas. You could spend hundreds on a new exercise machine or find one in a yard sale. You might pay a monthly fee to a fitness center or you could jog in the park for free. Following sound principles will help you to get what you want without wasting money. These can also keep you from purchasing something that may not work or could even cause you harm.

Following are some general principles to keep in mind as you contemplate making a fitness-related purchase:

- Look for goods and services that have been scientifically proven to be good for you. Avoid being convinced by emotional testimonials that have no scientific basis.
- Look for products and services that are consistent with sound exercise principles. There is no such thing as a quick fix or results without effort.
- Be wary of products and services that guarantee to improve your appearance. Assess the level of your vulnerability to avoid making decisions that may be very harmful to you.
- Be especially aware of the legitimacy of the source. Find out all you can about the people and companies selling the products or services.



**Figure 11.** Video exercise games are a novel and inexpensive approach to working out.

# Buying Personal Fitness Products

The key question to ask yourself when buying fitness products for your home is if you will use what you are buying. If you will use the equipment and it is safe, then it makes sense to get it if you can afford it and you really want it.

Video exercise games are a fun place to start. They are not terribly expensive and are really fun to do with a group. As with any purchase you are making, try it out first to see how well you like it. Is it just a novelty or is it something you would continue to do? Adding music to working out is another way to make it more enjoyable. Look for a product that has many features you enjoy (*Figure 11*).

The Federal Trade Commission (FTC) gives these tips for buying exercise equipment:

- Read the performance claims critically. Be leery of those that say the equipment provides easy or effortless results, burns more calories or will help you lose weight faster, or helps you lose weight in a particular area of the body.
- Be skeptical of testimonials and before and after pictures from satisfied customers.
- Ask yourself if the equipment will help you achieve your desired goal, and if you will stick to the program.
- Shop around. Don't be fooled by companies that advertise three easy payments of only \$49.95 a month. These prices may not include shipping, handling, and set-up fees. Ask about all costs before you close the deal.
- Get details on warranties, guarantees, and return policies. Secondhand items usually aren't returnable and don't carry the warranties new equipment does.
- Check out the company's customer and support services.

The FTC works for the consumer to prevent fraudulent, deceptive, and unfair business practices in the marketplace, and to provide information to help consumers spot, stop, and avoid them.

THE SCIENCE OF THE WHOLE INDIVIDUAL

## Leisure Activity Trends

What leisure activities are Americans doing today? The National Recreation and Park Association (NRPA) reports that 91% of Americans participate in local recreation and park activities. The most popular outdoor activities are games and picnics with friends and family, going to the pool, and walking or hiking. The Outdoor Foundation found the 10 most popular outdoor activities in the U.S. by number of participants:



They also reported on the five fastest growing outdoor activities:



Trends show that yoga, running, and hiking are among the most popular leisure activities of Americans. Of course leisure activities vary from state to state. Individual sports such as bowling, golf, tennis, and pickle ball remain popular among adults while the most popularly viewed sports are football, basketball, and ice hockey.

# Find the Right Wellness Program for You

Many communities have good facilities and programs provided by the recreation department, public schools or colleges, or organizations like the YMCA or YWCA. Usually these programs are not expensive, are family friendly, are run by reputable professionals, and do not require a long-term commitment. They typically offer quite a variety of activities to appeal to all ages. They provide a good way to get to know people in the community while enjoying recreational activities.

## Employee Wellness Programs

Wellness programs are offered as a benefit in many places of employment, especially larger companies. Even if you have to pay to get this benefit, it certainly is worth it. These programs are designed to help employees stay on the job, work more effectively, and avoid absenteeism. Therefore, they do health assessments, perform medical checkups, and provide more in-depth services than most wellness programs.

## Health Clubs

There are many commercial fitness clubs available for you to join. Many companies also use these private clubs for their wellness programs rather than building health facilities of their own. The facilities in these commercial enterprises are often state-of-the-art, making them competitive and attractive to the consumer. Because such a facility is a business, a primary focus will most likely be on sales. The sales constitute memberships, supplements, equipment, personalized programs, and classes.

Once you have established a measure of independence in terms of your workouts or activities, a place like this can be a real asset, providing facilities that you do not have to duplicate at home. The club you choose should be convenient and a place that you look forward to going to as often as possible.

## Personal Trainers

Facilities also hire personal trainers to promote sales, run programs, and educate clients on equipment and techniques (*Figure 12*). Personal trainers can be especially helpful if they have good, applicable education or training. When selecting a commercial exercise facility, ask how their trainers will help you and be sure to apply the principles previously discussed. You deserve to have someone who is genuinely interested in you and your wellness.



**Figure 12.** A personal trainer can help you learn how to properly, and safely, perform an activity that is new to you.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Fitness Pioneer

Jack LaLanne was a fitness celebrity who inspired and guided millions of people to live a healthier lifestyle. Born September 26, 1914, he grew up in the San Francisco area, and claims he ate a lot of sugar and junk food in his youth. He was greatly influenced by a talk given by American nutritionist Paul Bragg, after which he changed his focus to diet and exercise. He continued his fitness practices well into his 90s until he died in January 2011 (*Figure 13*).

Upon his graduation from Berkeley High School, California, he attended the Oakland Chiropractic College. In 1936 he left college and opened his own weight-training facility. He invented new machines, wrote books, appeared in movies, and had his own television fitness show that ran from 1951 to 1985, the longest-running show of its kind. He is also known for amazing fitness feats of strength and swimming. In 2005 he was inducted into the inaugural class of the National Fitness Hall of Fame.

Jack was a colorful character whose name is synonymous with fitness, having been named the “Godfather of Fitness,” the “King of Fitness,” and the guru of the health and fitness industry.



**Figure 13.** Jack LaLanne, shown here at age 95, was a fitness pioneer of the 20th century who inspired and guided millions of people to live a healthier lifestyle.

Just because people are athletes or fit does not necessarily qualify them to help you. There are college programs in exercise sciences, physical education, and physical therapy that graduate well-educated personal trainers. These trainers know proper techniques, progression of difficulty, and safety measures, and can help you to avoid fads, gimmicks, or procedures that are potentially harmful to you. Certification for personal trainers is offered by more than 100 organizations. Leading professional certifications are from the ACSM, the American Council on Exercise (ACE), the National Strength and Conditioning Association (NSCA), and the Aerobics and Fitness Association of America (AFAA).

# SPECIFIC FITNESS ACTIVITIES

Let's end the chapter by looking at a few of the fastest growing leisure-time pursuits in the United States. These activities may not be as well-known as traditionally played sports and games, which makes them ideal for those who want to try something new. But none of them are so obscure that you would have difficulty learning about the activity—in other cultures these are actually quite popular. Television, the Internet, community and school programs, and various forms of media offer information and experiences for many other activities that may be unfamiliar to you.

## Yoga

In Sanskrit, the language of ancient India, yoga means union—a uniting of mind, body, and spirit. There are eight limbs of yoga that pertain to this union. The limb primarily involved with the physical being is called asana. Asanas are the poses or postures one assumes during yoga that are practiced for wellness. Yoga has also become known as Hatha yoga, which is characterized by stretching, breathing exercises, and sitting meditation. Hatha is another Sanskrit word in which *ha* means sun and *tha* means moon.

Traditional yoga styles include Ashtanga or Astanga, Integral, Iyengar, Kripalu, Kundalini, Sivananda, and Vinyasa. *Vinyasa* (breath-synchronized movement) style or flow makes the asanas into dance-like moves, going from pose to pose in a rhythmical manner. Those who practice yoga claim that it reduces the negative effects of stress, improves sleep, and increases strength, balance, and flexibility. Some use yoga for relief of pain.

*Power yoga*, a term coined in the 1990s, put yoga practice into fitness communities. It is a more vigorous practice that strives to help people get fit (*Figure 14*). There is no set sequence of asanas, so the workout will vary from session to session. Power yoga also differs from the traditional because it does not focus on meditation.



**Figure 14.** Yoga enhances your balance, flexibility, and muscular strength, and may also improve your sleep and reduce your stress.

Yoga does have the potential to balance and establish a unity between body, mind, and spirit. It also has the potential to be a strain on various joints of the body, so be sure to use your knowledge of flexibility exercises as you try yoga. Another caution is that you should avoid being competitive. Those around you may be more advanced, so recognize those times when you can't perform the same poses and maintain the same intensity. Stay within your own limits. Millions of people enjoy yoga and you can too if you approach it gently and wisely.

There is an amazing array of books available on yoga—hatha yoga, yoga for children, breathing exercises, yoga for health, yoga from beginning to advanced, and many other specific topics. There is also instruction offered in schools, community programs, television, and Internet videos. It is certainly not difficult to access yoga and incorporate it into your individual or group leisure-time activity.

## Tai Chi

Tai Chi is the popular name for the ancient Chinese martial art, Tai Chi Chuan. The usual translations for Tai Chi Chuan are internal martial art or supreme ultimate fist. For most people today, Tai Chi is a physical activity done for health and relaxation, and is not even thought of as a martial art. It is a low-impact, weight-bearing aerobic exercise. The moves are slow and deliberate, each flowing into the next so that the body is continually moving. Tai Chi is rhythmical and develops balance and coordination. It helps to release tension and stress (*Figure 15*).



**Figure 15.** *Tai Chi involves moves that are slow and flowing, that develop balance and coordination, are rhythmical, and help to release tension.*

With emphasis on breathing, some call Tai Chi a moving meditation. Practitioners of Tai Chi can experience a calming of the mind and oneness of self. The National Center for Complementary and Integrative Health (NCCIH) lists Tai Chi as a mindbody practice within complementary and alternative medicine.

The basic philosophy of Tai Chi relates to an approach to fighting, a martial art. The main concept is to make physical contact and then follow the force until it is dissipated, rather than meet force with force. It is designed to achieve the yin/yang balance, even in combat.

Tai Chi is practiced by more than 2.3 million people in the United States. It is believed to provide a number of benefits:

- Improves physical condition, muscle strength, coordination, and flexibility.
- Improves balance and decreases the risk of falls.
- Eases pain and stiffness, such as that from osteoarthritis.
- Relieves tension and helps to manage stress.
- Improves sleep.
- Increases overall wellness.

NCCIH has funded research on the effects of Tai Chi to treat depression in elderly patients, on cancer survivors, on bone loss in postmenopausal women, on patients with chronic heart failure, and to treat symptoms of fibromyalgia, osteoarthritis of the knee, and rheumatoid arthritis. A review of 26 studies indicated that in 22 of them Tai Chi effectively reduced the blood pressure of participants.

Tai Chi is a safe activity for people who do not have existing medical conditions. As with any physical activity, it is good to check with your physician if you have health concerns. Certification for Tai Chi instructors is not standardized but most have studied with experienced practitioners.

## Chi Gong

Chi Gong (also spelled Chi Gung, Chi Kung, or QiGong) is a moving meditation done primarily while sitting or standing rather than stepping and moving about as is done in Tai Chi. Rather than being a martial arts focus, Chi Gong concentrates more on the chi or “vital life force” which places emphasis on healing, not combat. Meridians are channels by which the chi energy flows throughout the body. The meridians are the circuitry used by acupuncturists for myriad forms of healing. Chi Gong movements involve these points in the body, thereby mimicking the healing effects that come from acupuncture. In the Hindu culture *chi* is prana, Japanese use the term *ki*, and Hawaiians call it *mana*.

Acupuncture is practiced by thousands of physicians, dentists, acupuncturists, and other practitioners for the relief and prevention of pain and for various other health conditions. The healing potential of Chi Gong is an area of research in the United States, as is acupuncture. Chi Gong classes and information may not be as readily available as Tai Chi, but it is gaining in popularity. The physical activity level of Chi Gong is not of an intensity that would cause injury.

## Find the Activity That You Enjoy

To truly enjoy a physically active life, leisure pursuits can be done individually or with others. When you find activities you really enjoy, it is difficult to imagine your life without them. They become priorities because they add so much joy to your life.

If you follow wise consumer practices, you can find activities and equipment for your home that you will actually use. Active leisure may be an option for you individually, or something you can do with family or friends, or you can join a private fitness club. Spending time at a fitness club can also become a priority because it is such a great way to educate yourself, participate in programs, and to meet new people. If you are fortunate, there are community resources available to you that are very economical.

## Fitness Trailblazer

Dara Grace Torres was born April 15, 1967 and was the first U.S. swimmer to compete in five Olympic Games—1984, 1988, 1992, 2000, and 2008 (Figure 16). Dara has become a role model of fitness and wellness because at 41 years of age, this mother of a 2-year-old daughter became the oldest Olympic medalist in the history of swimming, winning three silver medals at the 2008 Beijing Summer Olympics. Actually, she is the first woman who ever competed in Olympic swimming past the age of 40. She only missed the gold medal in the 50-meter free-style by 1/100 of a second. Dara's performance in the 4 × 100-meter medley relay was the fastest ever 100-meter freestyle split, coming in at 52.27 seconds.

At the Beijing Olympics, Dara volunteered for the enhanced drug-testing program to offset any accusations of her being successful because of taking drugs. She says her secret weapon is the resistance stretching fitness program, Innovative Body Solutions, which she learned from Annie Tierney and Steve Sierra.

**Figure 16.** Dara Torres is a fitness trailblazer and the first female swimmer to compete in the Olympics after age 40. Photo credit: Bryan Allison



The fastest-growing leisure activities have been presented in the hopes that you may find something new or something of interest to you. It is possible to find instructors, classes, or other ways to learn any activity. The better you become at an activity, the more enjoyable it will be and the greater are the chances that you will continue doing it. Now is a great time to find activities that will be a joyful part of your entire life!

# MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Choose to participate in fun-filled physical activities.
2. Take advantage of opportunities to learn new skills in enjoyable recreational activities.
3. Make wise selections for creating a physically active lifestyle.
4. Recognize the health benefits you will receive from your physical activity.
5. Develop skills for engaging in a wide variety of leisure-time activities.
6. Keep your eyes open for new and available activities you might add to your repertoire in the future.

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## GLOSSARY TERMS

**Interval training:** A form of periodicity, shorter segments of exercise, each one followed by a rest interval.

**Periodicity:** Organizing physical activity into shorter segments with a rest period in-between rather than doing continuous exercise non-stop.

**Metabolic equivalent of task (MET):** The measure of the amount of energy expended at rest; 1.2 calories per minute.

**Physical activity:** Movement of the whole being that uses energy.

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## Maintaining a Healthy Weight

# **What Is a Healthy Weight for Me?**

With the constant bombardment from numerous sources heralding the ideal image for both women and men, how does a person come to accept his or her appearance? A billion-dollar industry is trying to persuade us that we must use their products to achieve the look that we really need and want!

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And sadly for our society, this bombardment is making us more and more dissatisfied with our appearance. Surveys indicate that most women and many men are dissatisfied with how they look and are unhappy with their bodies. Much of the concern centers on one's weight.



## After reading this chapter, you will be able to:

- › **LIST** the factors that influence how you perceive your body.
- › **DETERMINE** the healthy body weight for you.
- › **DESCRIBE** common reasons for unhealthy weight gain.
- › **IDENTIFY** methods for measuring body composition to determine health risks.
- › **EXPLAIN** how appetite works.
- › **DESCRIBE** the energy balance principle and calculate your caloric expenditure and caloric intake.
- › **IDENTIFY** the symptoms, causes, and consequences of disordered eating.
- › **UTILIZE** sound principles to maintain a healthy weight.

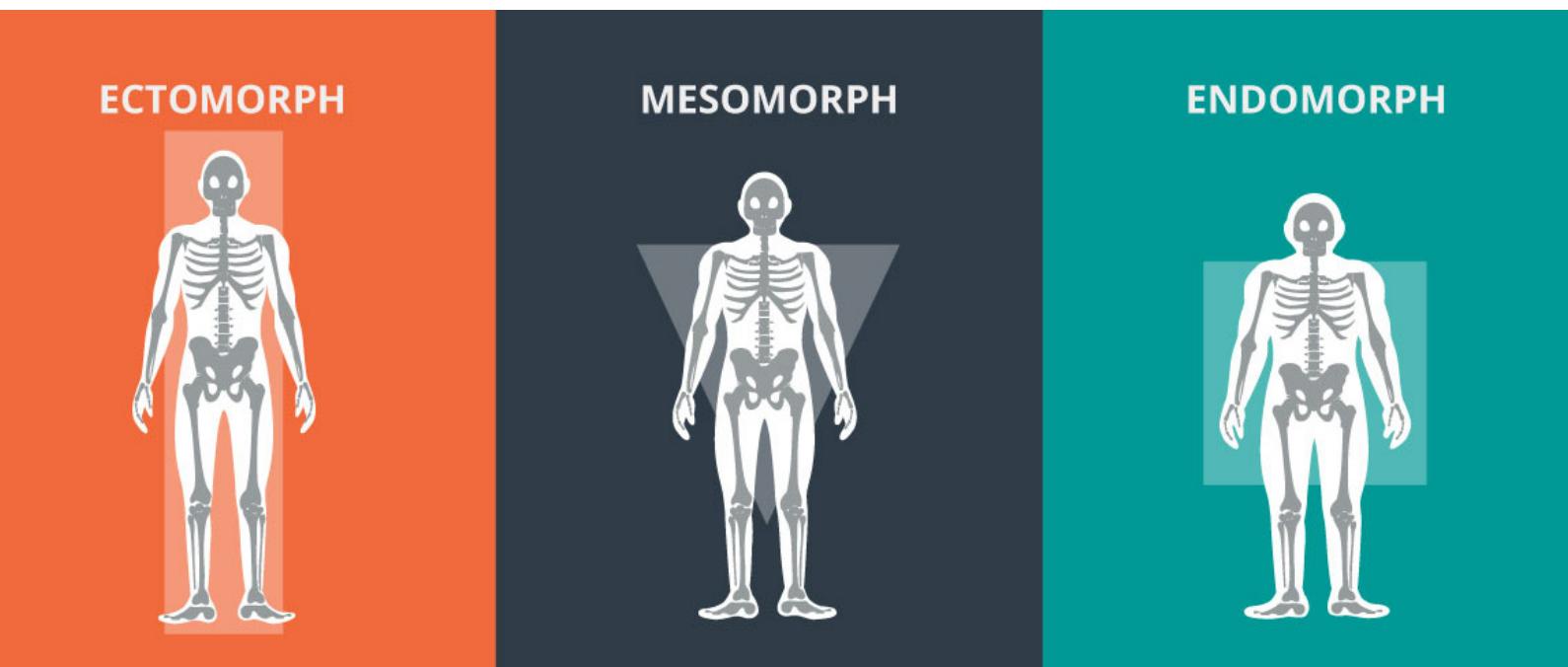


# What Is a Healthy Weight for Me?

maintaining a healthy weight

## YOUR EXPECTATIONS AND OTHER FACTORS

There are many factors that contribute to our appearance that are beyond our control—and that of advertised products! These include our basic body size and shape, which are primarily determined by our genetic makeup. In addition to our inherited characteristics, technological advances and cultural pressure contribute to our perception of how we should look.



**Figure 1.** The three general body types: ectomorph, endomorph, and mesomorph.

# Body Type and Frame Size

While it is important to strive for a healthy weight, one must also be realistic about his or her own body. We have certain inherited features that constitute our physique. Both body type and frame size significantly affect the size and shape of our body, regardless of weight.

Somatotyping tells us we have an inherited body type. Although not a sophisticated scientific classification, this general body typing is helpful to observe genetic tendencies to see why we all can't be a size 2. There are three general body types: *ectomorphic*, *endomorphic*, and *mesomorphic* (*Figure 1*). Ectomorphs are long and lean. There are very few men and women who are true ectomorphs. Endomorphs naturally carry more fat and have a soft, round appearance. The female body shape is the standard endomorph. Mesomorphs have a triangular body shape and well-defined musculature. The male body shape is the standard mesomorph. However, women can be mesomorphs and men can be endomorphs. In fact, most people are composed of some of each type.



**Figure 2.** A person's height and wrist measurement determine the body frame size. **Source.** National Institutes of Health.

Body frame sizes include small, medium, and large. Measuring the elbow, ankle, or wrist is one way to determine frame size. If you are interested in knowing your frame size, using a tape measure, measure the circumference of your wrist just below the wrist bone about where you would wear your watch (*Figure 2*). Use this measurement and your height to find your frame size in *Table 1*.

**Table 1. Determining Your Body Frame Size**

Height		Wrist Measurement		
		Small Frame	Medium Frame	Large Frame
WOMEN	Shorter than 5'2"	< 5.5"	5.5" – 5.75"	> 5.75"
	5'2" – 5'5"	< 6"	6" – 6.25"	> 6.25"
	Taller than 5'5"	< 6.25"	6.25" – 6.5"	> 6.5"
MEN	Taller than 5'5"	5.5" – 6.5"	6.5" – 7.5"	> 7.5"

When frame size is factored in to determine one's normal weight, there is a range of some 60 pounds for what is considered an optimum weight for people of the same height. Unfortunately, most weight charts only give a single figure for desired weight per height, ignoring this significant factor in determining desired weight. With a range of nearly 60 pounds for any given height, this is a factor that just cannot be ignored!

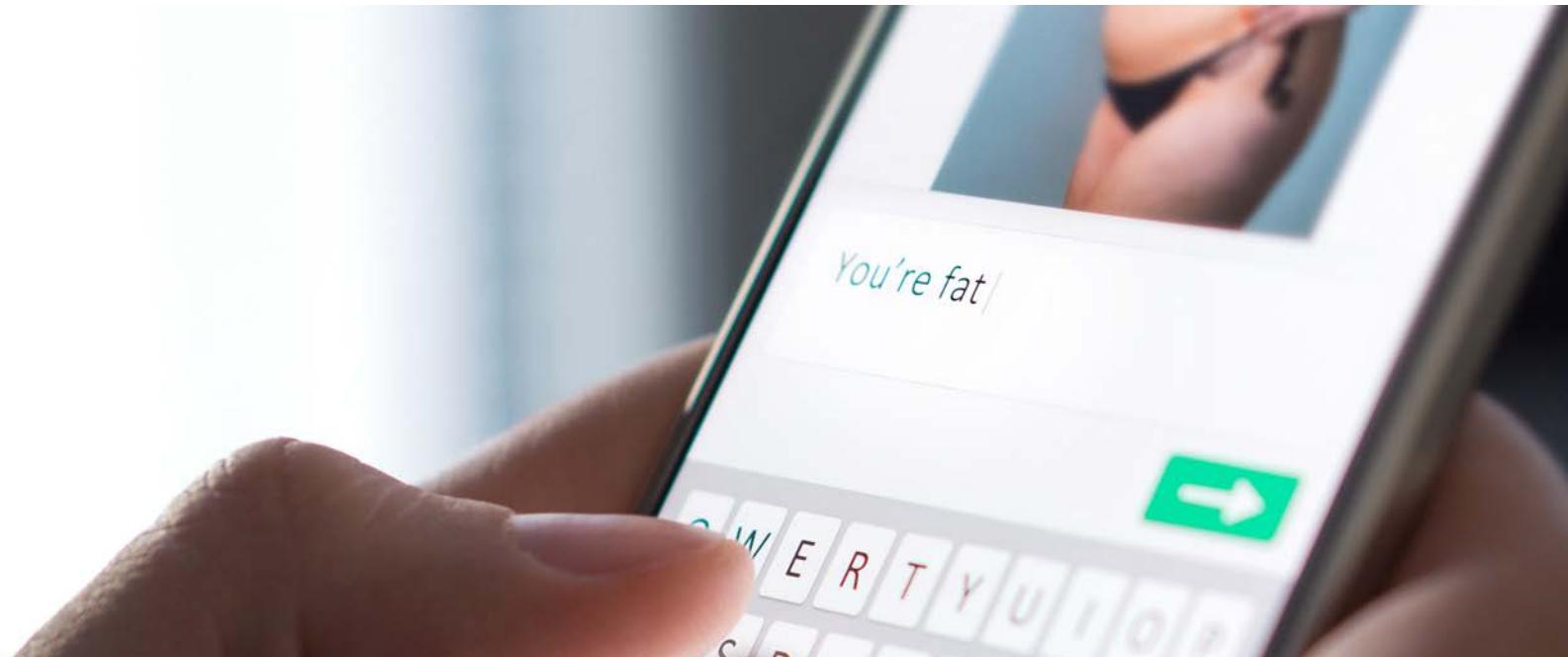
## Genetic Technology

Much of what constitutes our appearance is inherited. Babies of all races, cultures, and sizes are born every day. As our knowledge of genetics increases, we have options available to us today unknown by past generations to manipulate genes and alter our bodies. These options may also cause us to develop a sense of discontentment with our own natural state. Here may be another type of pressure to not accept our bodies that is far subtler than media messages. The question is: With improved scientific knowledge and technology, what part of our belief system will guide our acceptance of self? Our understanding and belief about the nature of our being become vital to our daily choices—and these will be highly individualized choices.

## Cultural Bias

There continues to be a cultural bias toward thinness. It seems so ironic because, over the past several decades, the percentages of overweight and obese adults have reached epic proportions—about 70 percent of the population. A great concern is that approximately one-third of school-age children and adolescents are also overweight or obese, and in some minority groups the proportion approaches 1 in every 2. Billions of dollars are being spent for health care and other costs attributed to the number of people who are overweight.

While it is important to strive for a healthy weight, social stigma against being overweight is clearly not productive—if it were, fewer people would be overweight in the United States. Being model-thin should not be the goal or the expectation. Concentrating on combining healthy eating and exercise habits with a healthy dose of self-acceptance should be the goal. We live in a time when enormous pressure is making us overly worried and concerned about our weight (*Figure 3*).



**Figure 3.** How do we come to accept ourselves just as we are and be content with what, for each of us, is a healthy weight?

# WHAT IS YOUR HEALTHY WEIGHT?

Because of the culture in which we live, having holistic attitudes and beliefs may be one of the most important factors in maintaining a **healthy weight**. The key to having a healthy weight throughout our lives is to be at peace with our bodies. The worst thing we can do is engage in a constant battle within ourselves. The resulting negative stress can actually lead to weight gain. Attempts at losing weight by dieting—significantly reducing food intake—has been proven to ultimately result in weight gain because of the ill effects on our metabolism. Unfortunately, these battles with our bodies are the norm for many.



*Figure 4. Love and respect for who you are is an important step toward well-being.*

## Respect the Body You Have

Developing a genuine respect for your body just as it is—genetics, frame size, and all—is vitally important (*Figure 4*). Being at peace with your body will enable you to enjoy a harmony of being, a peace within ourselves. The lack of negative stress regarding one’s body and genuine respect for self set the stage for a realistic acceptance of our whole self. With this healthy regard for ourselves, the various cultural pressures won’t be so intense. That allows us to take a much more intelligent approach to weight management. We will be guided by our own internal acceptance rather than driven by external pressures. Wouldn’t each one of us rather be directing our own choices and attitudes rather than being run around by others—particularly by those trying to make a dollar off of us?

Having a healthy self-regard will also help establish a foundation for approaching weight management in a sensible manner. For most of us, weight management now and throughout our lives has to do with both physical activity and what we eat. More often than not we may associate weight loss just with food. Unless we have unusual health challenges, most of us will maintain a healthy weight by eating well and enjoying a physically active lifestyle. (Emphasis on the enjoying!)

# Determine the Right Weight for You

What then are the components to determining your own healthy weight? There are many factors to consider beyond the number of pounds reported on the bathroom scale. Here are some actions to take to get started:

- Start with a positive attitude toward your body—a genuine respect for who you are.
- Consider your body type and your frame size.
- Measure the size of your waist.
- Realize that it is healthy to acknowledge a range of possibilities for your body weight.
- Ask yourself, "What weight feels good to me?" This will help you come to grips with what would be a healthy range of pounds for you.

Realize that healthy weight may be below your current weight, but also may not involve being rail thin. Further understanding may come with additional body composition measures explored in this chapter. Fundamentally, if all the knowledge you gain can help you appreciate your body size and not be obsessive about weight, you are on your way to maintaining a healthy weight throughout your life!

## CAUSES OF WEIGHT GAIN

There are many factors in addition to what foods we consume that can cause weight gain. An inactive lifestyle, being a couch potato, is one of the leading factors that cause people to be **overweight**. Stress is a part of nearly everyone's life today and can be a major contributor to weight gain. Emotional eating can become habitual. Consider if some of these factors are present in your own life.



**Figure 5.** Physical activity can be an opportunity to socialize and build relationships as well as to exercise.

# Lack of Physical Activity

Careless consumption of calorie-rich foods causes problems for some. But one of the reasons so many are overweight comes from lack of exercise or being sedentary. Although nearly every adult will attest that physical activity is basic to being healthy, in spite of that knowledge, a higher percentage of those who are overweight or obese report getting no physical activity in leisure-time pursuits. We evidently know that physical activity is good for us, but for some reason, we do not value it enough to do it—how sad.

When people are not being physically active each day it not only jeopardizes their health, but they miss the enjoyment that comes with an active lifestyle. Physical activity is not just for our bodies but also for our whole selves. Being active prompts feelings of happiness and optimism, confidence to achieve, and helps to reduce tension and worry. Physical activity helps to create new brain cells. It also provides a setting for socializing, healthy enjoyment with others, or if preferred, a joyful solitude (*Figure 5*).

## Dieting

When obsessed with weight, many become habitual dieters. A restriction in the amount of food eaten may result in an immediate weight loss; however, it also puts the body into a “survival mode” characterized by a reduction in metabolism. With a slower metabolism, fewer calories are burned. In addition, muscle may be lost during the weight loss. You don’t want to lose muscle because it is also good for burning calories.

More often than not, the weight lost during dieting will be regained, and the newly added weight may be composed of more fat than muscle. If repeated **weight cycling** is experienced, which it often is, it is called yo-yo dieting (*Figure 6*). Research indicates possible added problems from yo-yo dieting such as heart problems and a predisposition to cancer due to increased stress on the body systems.



*Figure 6.* Yo-yo dieting usually results in even more weight gain.

## Emotional Eating and Stress

Many of us have a fairly sound understanding of what constitutes good nutrition; however, we find it challenging to eat well. Often it takes quite a bit of discipline. Some people may find that their eating revolves around emotions and circumstances. Do you use food as a way to cope with emotional stress? Rather than dealing with a particularly challenging event in your life, do you turn to food for solace (*Figure 7*)?



**Figure 7.** Does how you feel determine what you eat?

It could be that an authority figure in your life is restricting your food intake in a controlling manner. Instead of confronting the individual with your resentment or anger, you may overeat in an effort to be the one in charge of your own life. This may also be an unhealthy response to criticism from others whose opinions of you matter to you. One physiological source of chronic negative stress is the excessive amount of belly fat one carries. The extra abdominal fat is a chronic stressor that sets off a mechanism to slow down metabolism, alter normal hormone balances, and raise blood sugar.

It may seem to you that losing weight is impossible, and you have just resigned yourself to being overweight and so make no attempt to eat healthier. It would be good to analyze your motivation for eating in a situation void of the pressures you are feeling. It may help to talk to a counselor or take advantage of other resources available to assist you.

## Poor Eating Habits

Poor eating habits and food choices also contribute to weight gain. Fast food has become a way of life, particularly for college students. But fast food is no longer the culprit that it was initially. It is possible to eat fast food and still get the nutrients your body needs from vegetables, fruits, grains, and good sources of protein (*Figure 8*). One of the biggest problems we face today is portion size at restaurants—both fast and slow. Portion sizes have increased remarkably for both food and drink. But you can get the most value for your dollar by eating half of what you are served at the time and saving the other half for later. Water is readily available, so you can also make wise choices regarding what you drink. With the great abundance of foods and beverages we enjoy today, it is up to each of us to decide what we are going to eat. Making healthy choices today may not be easy because of all the delicious and inexpensive unhealthy options, but it is certainly possible!

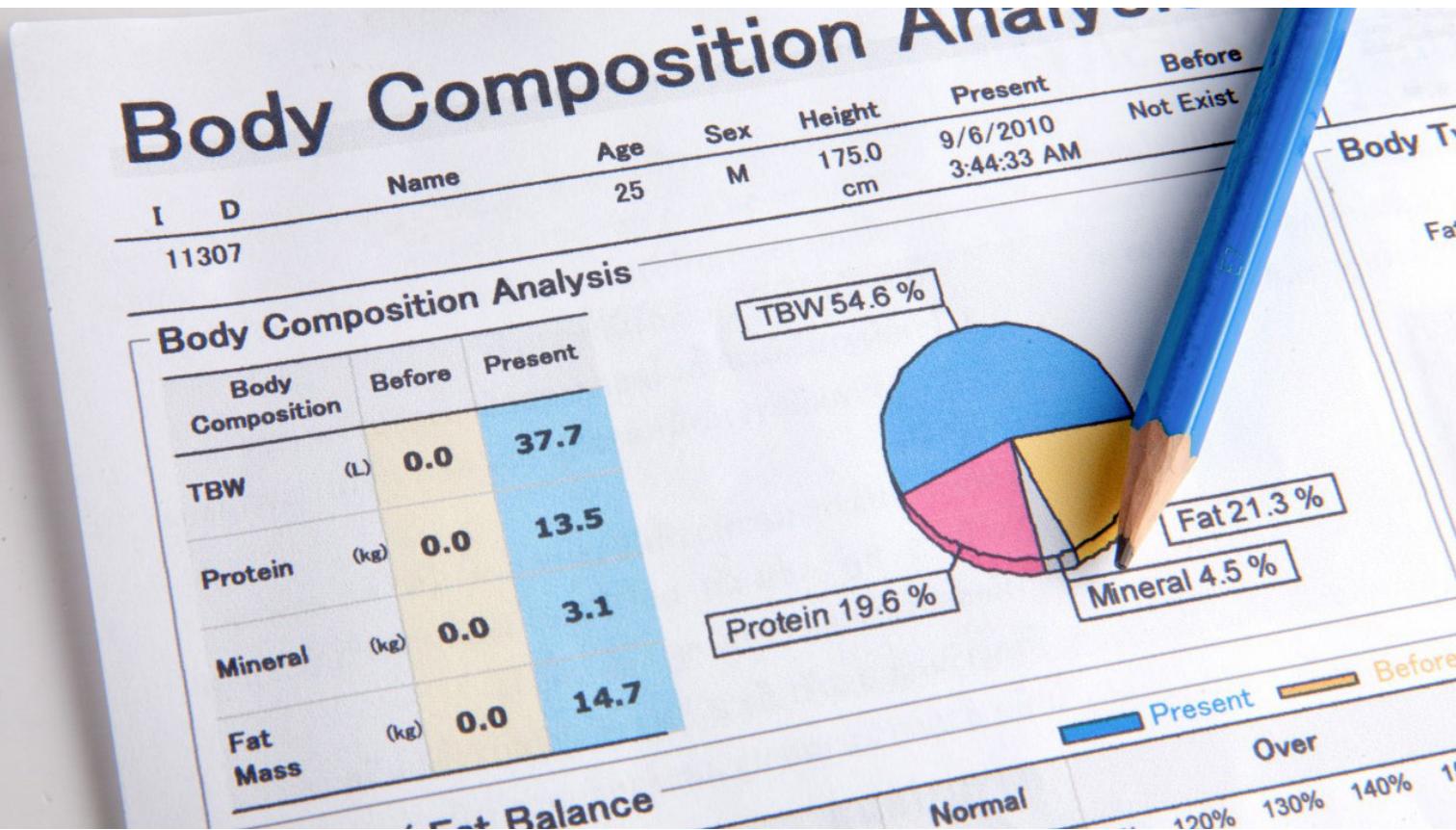
The best possible course of action is to not become overweight or obese. Stay active and as healthy as possible going forward. Make good decisions and increase your knowledge of nutrition to avoid putting yourself in a position where you need to lose weight. It is far easier to keep from gaining weight than it is to lose it.



**Figure 8.** Today we have more healthy food choices at fast-food restaurants.

## HOW TO MEASURE YOUR RISK

Many of the measures for body composition have been developed to establish population standards for underweight, normal weight, and overweight and obesity. Some of these measures are highly sophisticated and only available for use in research laboratories. Others are available online as a handy guide for anyone to use (*Figure 9*).



**Figure 9.** There are several ways to measure body composition, from more practical measurements that you can do yourself to more sophisticated methods that are done in clinics and laboratories.

# The Health Risks of Being Overweight or Obese

The National Institutes of Health (NIH) **defines** obesity as a chronic disease. It's a very complex issue in a diverse culture. In North America, tobacco use, unhealthy diet, and physical inactivity are the three leading causes of preventable premature death. Approximately two-thirds of cancers, vascular diseases, and other chronic conditions are directly related to these three factors. Chances for coronary heart disease, stroke, and hypertension increase with obesity.

The American Cancer Society lists colorectal, uterine, breast, esophageal, kidney, and other cancers as related to obesity. They estimate that obesity is a factor in 14 percent of all cancer deaths in men and 20 percent of cancer deaths in women. Type 2 diabetes also has a direct link to obesity. Approximately 85 percent of people diagnosed with type 2 diabetes are obese at the time of diagnosis. Obesity may result in loss of job and medical insurance coverage. Psychological stress and social discrimination may also accompany obesity. Knowing your body composition can help you determine risks associated with your weight.

## Body Mass Index

The **Body Mass Index (BMI)** is a measure of body composition based on one's height and weight, and it is used by the NIH to define **underweight**, normal weight, overweight, and obesity. The BMI does not measure the percentage of body fat, but it correlates well with laboratory measures of body fat percentages (*Figure 10*).



*Figure 10.* BMI is a general measurement of body composition.

The BMI gives a more complete picture of body composition than weight alone. One limitation of the BMI is that it does not take muscle mass into consideration because the measure is based on weight and height, not the amounts of muscle and body fat. Therefore, people with a well-developed musculature will get more accurate data from other measures of body composition. But the BMI is a useful measure for the general population. Here is the formula to calculate your BMI and an example calculation:

$$\text{BMI} = \frac{\text{weight}}{\text{height}^2} \times 703$$

For example, for a person who is 61 inches tall (5 feet, 1 inch) and weighs 160 pounds, the BMI calculation would look like this:

$$\begin{aligned} & 160 \text{ lbs} \div (61 \text{ in} \times 61 \text{ in}) \times 703 \\ & \text{BMI} = 30.2 \end{aligned}$$

*Table 2* displays standard measures of overweight and obesity based on BMI.

**Table 2. Standard Measures of Overweight and Obesity Based on BMI**

BMI RANGE	
Overweight	25 – 29.9
Obese	30 – 34.9
Very obese	35 – 39.9
Extremely obese	40+

## Waist Measurement

Practical measures are not only available, but may help us focus our attention properly and realistically, and help to keep us from obsessing about our weight. It may surprise you to learn that the most important tool for helping you manage your weight is a simple tape measure. Recent studies have shown that the size of our waist is as predictive of disease risk due to excess weight as are other measures.

## Subcutaneous Fat and Intra-abdominal Fat

Subcutaneous fat and intra-abdominal fat—that which is found deep within the abdominal cavity—put us at risk for obesity-related diseases. Abdominal fat has been a hot topic of discussion for years, but now we are paying more attention to this phenomenon and its significance.

## The Omentum

The fat-storing **omentum** is a fold of the peritoneum (the lining of the abdominal cavity) located next to the solid organs of the body. When normal it has a light and lacey appearance. When enlarged due to excess fat, it looks heavy and solid. The omentum protects the organs in the abdominal region and is an energy source for them. Lack of physical activity encourages fat from the omentum to move rapidly into the liver rather than to the muscles as it does when people are physically active. This unused energy in the liver frequently manufactures triglycerides and eventually higher levels of LDL, which increases the risk of cardiovascular disease.

Another major factor in weight management is chronic stress. We live in a culture today that tends to encourage chronic stress. "How are you doing? Are you busy?" is a popular greeting, and "I'm crazy busy" is a common response. We rarely ask, "How are you doing? Are you relaxed"? When under constant low-level anxiety or chronic stress, the body releases large amounts of the stress hormone cortisol that is absorbed by the omentum. The cortisol increases the capacity of the omentum to store intra-abdominal fat. Therefore, chronic stress tends to increase the size of the waist.

Stress hormones also adversely affect insulin and blood glucose levels, leading to type 2 diabetes. It is not just excess weight in general, but abdominal weight in particular that increases the risk for developing type 2 diabetes—up to 10 or more times greater than does fat in other areas of the body. Omentum fat uses up insulin, resulting in decreased movement of glucose from the blood to other organs and tissues. The blood sugar that isn't being transported properly remains in the blood, where it can cause higher blood pressure, a weakened immune system, nerve damage in feet and hands, and eye and joint problems. *Metabolic syndrome*, or Syndrome X, is the presence of high blood pressure, high blood sugar, high blood lipids, and high abdominal fat mass.

This all sounds terribly depressing, but the great news is the omentum can also be your friend, protecting your organs and providing positive energy for your body. Your choices to be physically active and to eat wisely will keep you from developing the debilitating problems associated with increased fat in the omentum.

## Waist Size and Health Risk

A waist size of  $32\frac{1}{2}$  inches or less for women and 35 inches or less for men is considered healthy. A waist size of over 37 inches for women and over 40 inches for men puts one in the highest risk category. Another standard is for your waist size to be half of your height in inches (*Figure 11*).

To get a true picture of your waist size, you want to measure the omental fat. To get the measure of your omental fat rather than just the subcutaneous fat at the waist, wrap the tape measure around your abdomen at belly button level and draw in your breath, sucking in your stomach. Measure your waist circumference while holding your breath.



**Figure 11.** A healthy waist measurement is  $32\frac{1}{2}$  inches or less for women and 35 inches or less for men.

## Indirect Measures of Body Fat

*Skinfold* measurements are the least expensive and, therefore, one of the most frequently performed measures of **percent body fat**. If performed by skilled technicians, skinfold measures correlate highly with underwater weighing measures (*Figure 12*).



**Figure 12.** Skinfold measurement is a way to measure body fat percentage.

*Underwater weighing* is one of the most accurate of the measures of body fat percentage. A person is completely submerged underwater and exhales all air out of the lungs. An average of three weight readings under these conditions is the measure used to calculate the percent body fat.

## Laboratory Body Fat Measures

There are several laboratory measures of body fat percentage when more precise measurements are needed. People don't typically have immediate access to these methods as they require professionals using specialized equipment. These include bioelectrical impedance analysis (BIA), air-displacement plethysmography (BodPod), dual-energy X-ray absorptiometry (DEXA), and total body electrical conductivity (TOBEC). In the BIA, the measure is the body's resistance to a small electrical current. The higher the resistance, the greater the percentage of fat since fat-free tissues are good conductors of electrical current. In the BodPod method, the person sits inside a chamber that measures the amount of air displacement, and thus determines the percent body fat. DEXA uses X-ray beams of different energy levels to measure body cell mass. DEXA is more frequently used to measure bone density. TOBEC uses a magnetic field which the body passes through to measure lean body mass.

## HOW YOUR APPETITE WORKS

Recently there has been a flurry of discoveries of brain chemicals affecting feelings of hunger and satiety. Research has also demonstrated that appetite and satiety are self-regulating. Much research continues today for a complete understanding of the way appetite functions.

# Hormones Affect Feelings of Hunger

Two brain chemicals have emerged as key players of how appetite works: ghrelin and leptin. **Ghrelin** is a hormone produced primarily in the stomach that tells the brain when we are hungry, so it *stimulates* appetite. The hormone **leptin**, produced primarily in **adipose tissue** where fat is stored, is the counterpart of ghrelin. It makes us feel *satiated* (full). Leptin and ghrelin are secreted respectively in fat cells and the lining of the stomach. They are peripheral signals that have central effects. The satiety center of the brain is in the hypothalamus, the site of the ghrelin and leptin signals.

## Ghrelin Makes You Feel Hungry

Ghrelin is thought to be the *primary* hormone involved in hunger. Masayasu Kojima and colleagues reported the discovery of ghrelin in 1999, although there had been reports on the ghrelin phenomenon as early as the 1980s. The name ghrelin is based on another role it plays related to growth—the root *ghre* means to grow. Ghrelin also slows metabolism and decreases the body's ability to burn fat. Ghrelin works along with leptin to prevent energy deficits in the body.

## Leptin Makes You Feel Full, Stimulates Calorie Burn

In addition to making you feel full, leptin is a protein hormone that increases metabolism. In other words, leptin stimulates the body to burn more calories. The discovery of leptin was reported in the December 1994 issue of the prestigious scientific journal *Nature*. Dr. Jeffrey Friedman, a molecular geneticist at Rockefeller University, and his colleagues identified a gene called *obese* (*ob*) that codes for the hormone he later called leptin. The choice of the name leptin was based on the Greek word *leptos*, which means thin.

Usually higher levels of leptin help to keep your appetite at a normal level. It seems paradoxical, but research has also found high levels of leptin in people who are obese. If leptin reduces the feelings of hunger, then shouldn't obese people have lower levels of the hormone? We have since come to understand that obese people are resistant to the effects of leptin. In other words, the body compensates for a small reaction to the normal amount of the hormone by producing more leptin. This leptin resistance is like the insulin resistance found in people with type 2 diabetes.

# Appetite and Satiety Are Self-Regulating

The body is designed such that these brain chemicals regulate themselves. As a result, our bodies are designed for a normal, healthy weight. A body does not want to carry around extra fat. Lifestyle choices can support this normal functioning, or disrupt the way our bodies are designed to work. For instance, lack of sleep produces more ghrelin than normal and less leptin than normal. So lack of sleep can increase appetite and reduce the body's ability to burn calories (*Figure 13*). When you deprive yourself of food, as when you are dieting, ghrelin production is greatly amplified. As the production of ghrelin speeds up, your hypothalamus receives the signal to eat—and as most of us realize, it is hard to ignore that basic urge. When we deprive ourselves of both sleep and food, we are working against our normal biological mechanisms.

Exercise helps to regulate ghrelin and leptin production. When you exercise regularly, your cells become more responsive to leptin. Exercise helps to normalize hunger and helps your body burn calories efficiently.



**Figure 13.** Chronic lack of sleep can increase your appetite and reduce your body's ability to burn calories.

Just as someone's food choices can ultimately impact their blood pressure, what you eat for snacks and meals also impacts ghrelin, leptin, and the satiety center of your brain. Healthy foods will keep these working properly, and unhealthy foods can have a negative effect. The brain does not regard simple sugars and artificial sweeteners used in processed foods and many beverages as regular food. Therefore, ghrelin production continues, stimulating the appetite even though you are eating many calories. This same phenomenon accompanies many low-fat foods (such as some "healthy" ice creams or yogurts) that have the fat removed but supplies flavor through high sugar content—ghrelin continues to be produced, while leptin levels do not rise.

Research is being done now to try to understand how emotional stress influences the normal chemical functioning of ghrelin and leptin, and the many other factors affecting appetite. There is clearly a complex interplay of the body and mind involved in this primary function of our lives. While much is still to be discovered, one thing is clear—each body is designed to have a healthy weight range. If we will respect our biological functioning and work with it, we will have the best results. Trying to trick our bodies into losing weight by not giving ourselves food, or by giving it manufactured "diet" foods, will inevitably result in abnormal functioning that at some point has to be reconciled.

## CALCULATING ENERGY BALANCE

The age-old energy balance principle is simplistic but logical. Balance your calories consumed with those expended and you will maintain your normal, healthy weight. Oh, if it was only that easy! If there were no other complicating factors, this would be the answer. Let's look at how it really works.

### Calculating Your Daily Caloric Expenditure

The **Basal Metabolic Rate (BMR)**—also termed the Resting Metabolic Rate or RMR—is measured in calories and is the energy needed by the organs of the body to sustain life while in a resting state. While sedentary RMR accounts for about 70 percent of calories burned, increased activity results in greater calories expended in addition to the RMR.

The following is a simplified calculation of daily caloric expenditure using an estimate of the RMR and a general factor for estimating physical activity.

**Step 1:** Calculate your RMR for your gender and age using the following formulas in *Table 3*.

**Table 3: RMR Formulas Based on Age and Gender**

AGE	MEN	WOMEN
18-30	$6.95 \times \text{body weight} + 679$	$6.68 \times \text{body weight} + 496$
31-60	$5.27 \times \text{body weight} + 879$	$3.95 \times \text{body weight} + 829$

**Step 2:** From *Table 4*, select the activity factor for your typical level of physical activity.

**Table 4. Activity Factor for Physical Activity Level**

TYPICAL PHYSICAL ACTIVITY LEVEL		ACTIVITY FACTOR
<b>Sedentary</b>	mostly resting with little or no activity	1.2
<b>Light</b>	occasional activity	1.4
<b>Moderate</b>	daily planned walk or other activity	1.6
<b>Heavy</b>	daily workout for several hours	1.9
<b>Extremely</b>	daily vigorous workouts, training for competition	2.3

**Step 3:** Multiply your RMR by your activity factor to find your daily energy requirement.

## Track the Calories That You Consume

The second part of the energy balance equation is the calories you consume. Keep track of the calories you consume for several days to get an approximation of your normal caloric intake.

If your goal is to maintain your current weight, your caloric intake and caloric expenditure should be close to the same (*Figure 14*). What if your goal is to lose some weight? To lose a pound of weight per week requires the expenditure of 3,500 calories per week, or 500 calories per day. Accumulating 10,000 steps per day for the 150-pound person in the previous example would just about do it! Any combination of lowering caloric intake and increasing caloric output to burn off 500 calories a day would give you the results you desire. A safe and healthy rate of weight loss would be 1–2 pounds per week.



**Figure 14.** To maintain your weight, you should balance physical activity (caloric expenditure) with how much you eat (caloric intake).

## Reduce Calories and Increase Exercise to Decrease Body Fat

Studies show that wisely reducing caloric intake combined with regular exercise decreases body fat, especially in the omentum. In longitudinal studies of weight management, the group that only exercised maintained weight loss better than those that only reduced calories and those that combined reduced caloric intake with exercise. Regular exercise is a key to weight loss and maintenance!

How important is intensity of exercise to weight management? The answer depends on what your goals are. Low-intensity exercise can result in losing fat (*Figure 15*). High-intensity exercise burns more calories. If a person is capable and interested in high-intensity physical activity, that should be encouraged. A combination of both low-intensity and high-intensity exercise, when possible, is ideal for many people.



**Figure 15.** Fat can be lost from even low-intensity exercise, like riding a bike to class.

National standards recommend that adults accumulate 30–60 minutes of exercise per day. An easy and fun way to measure this is to use a pedometer or digital device and accumulate at least 10,000 steps per day, which is equivalent to about 5 miles (*Figure 16*). To be effective, one simply needs to *accumulate* that number of steps. This can be throughout your day or in small 10–15 minute increments. You don't need to walk for hours at a time to accumulate them all at once! Studies show that incorporating activity into each day is the best way to maintain a healthy weight throughout your life.



**Figure 16.** Step counter devices and apps provide an easy way to track your activity. Strive for about 10,000 steps per day—it may be easier than you expect!

The energy balance principle emphasizes the equalization of calories taken in and then burned. How can you use your best thinking to achieve a positive balance in your life? Not by punishing or fighting against your body, but by eating sensibly and exercising regularly—which can become the mainstays of a very enjoyable life. Ask yourself, do you eat to live, or live to eat?

## EATING DISORDERS

When eating habits jeopardize a person's health, mental well-being, or even their life, we call this condition an eating disorder. **Disordered eating** is an abnormal preoccupation with food, calories, fat, or body weight, and the accompanying behaviors associated with the preoccupation. Estimates are that 8–10 million Americans experience disordered eating at some point in their life. These disorders are reported to be more prevalent among young people and women. Proportionately higher numbers are also seen among athletes, dancers, models, and others whose focus is on physical prowess or appearance. Three common eating disorders are anorexia nervosa, bulimia nervosa, and binge eating disorder.

### Anorexia Nervosa

People with anorexia nervosa are obsessed with being thin and are extremely fearful of becoming fat. This is a mental illness in which a person starves herself or himself. A complicating factor is denial that a problem exists—a typical attitude in any addictive behavior. People suffering from anorexia nervosa tend to have a distorted body image (*Figure 17*). For example, an extraordinarily thin girl whom others would call gaunt or bony can look in the mirror and see herself as fat. Denial and distorted body image are great obstacles to treatment and rehabilitation.



**Figure 17.** People suffering from anorexia nervosa usually have a distorted body image—what they see in the mirror is very different from how others see them.

Authoritarian parents who rob children of their own identity are a common factor reported in cases of teenagers with anorexia nervosa. Feelings of inadequacy and low self-esteem combine with obsessive interest in appearance and achievement in these teenagers. Anorexia nervosa can be very dangerous, with more than 10 percent of those having the disorder losing their lives because of it.

For a person to be diagnosed with anorexia nervosa, the following symptoms and signs may be present:

- Body weight is 15 percent or more below normal
- Inordinate fear of becoming fat in spite of being far below normal weight
- **Amenorrhea** in women (abnormal cessation of menstrual period)
- Distorted body image

## Bulimia Nervosa

A person suffering from **bulimia nervosa** will ingest huge amounts of calories at one time and then purge what has been gorged by vomiting or using laxatives. Often the person compulsively binges on high-calorie sweets such as cookies, ice cream, doughnuts, and so on. Bingeing and **purging** are usually done in private. It is not unusual for a person with bulimia to diet and exercise excessively between binges.

Bulimia may not affect one's weight, so it is easy to hide. When with other people, the bulimic person may eat quite normally. Bulimia is more common than anorexia, but not as life threatening. It can begin with frequent restricting of food through dieting that results in a binge-and-purge session. Later it becomes uncontrollably compulsive. It is often associated with clinical depression.

To declare that a person has bulimia nervosa, the following signs and symptoms may be present:

- Two binge-purge cycles per week for three consecutive months
- Self-induced purging via vomiting and/or abuse of laxatives
- Compulsive, out of control eating behaviors
- Abnormal preoccupation with body size and weight

## Binge Eating Disorder

**Binge eating** is a dangerous disorder that can be life-threatening. Binge eating includes regular episodes of eating large amounts of food quickly. People who binge often feel out of control when they are binge eating. They also have feelings of stress, guilt, and shame. According to the National Eating Disorders Association, binge eating is the most common eating disorder in the United States.

Other terms used for this type of disordered eating are *compulsive eaters* and *food addicts*. This disorder is like bulimia nervosa except that, after bingeing, the individual does not purge. Binge eating is often associated with dieting, depression, and dissatisfaction with self (*Figure 18*).

To declare that a person has binge eating disorder the following signs and symptoms may be present:

- Binge eating two days per week for six consecutive months
- Eating when not physically hungry
- Frequent dieting
- Using food to cope with psychological problems



**Figure 18.** Binge eating is often caused by emotional factors, such as dissatisfaction with self.

# PRINCIPLES FOR MAINTAINING A HEALTHY WEIGHT

How important to you is maintaining a healthy weight? You can begin with your own attitudes. Believe in yourself, in your goodness. Be your own best friend. Be grateful for who you are, just as you are. If you've spent any time contesting against your own body, analyze why and bring that disharmony within yourself to an end. This first step is crucial. Without it, other efforts will be weakened. Take this first step of respecting who you are and finding joy in the harmony of your being. This is up to you. If, in your culture, it is fashionable to be disparaging toward your body, take a stand and change the culture! At least begin with yourself (*Figure 19*).



**Figure 19.** A healthy self-image is a crucial first step in changing your behavior.

There are many wonderful programs available that promote physical activity. One such program from the National Institute of Health (NIH) is "Staying Active at Any Size" that asks, "Would you like to be more physically active, but are not sure if you can do it? Good news—if you are a very large person, you can be physically active and have fun and feel good doing it." No matter your circumstances, you can find a way to be positive about being physically active. Maybe this is not an issue for you, or maybe it is a big issue in your life. Again, analyze why it is a problem if that is the case. Decide now that you will discover ways to be physically active. Decide now that this can be fun for you and bring a wonderful dimension to your life.

Are you in any way obsessive about eating? Do you often think about eating? Is there anything about your eating habits that you feel you need to lie about or hide? If so, do something positive to eliminate those behaviors. Find ways to make your eating fairly automatic so it doesn't require much thought. Find ways to enjoy eating healthy foods; it is possible to change your tastes—your likes and dislikes.

Don't go to extremes. Eat a simple breakfast you can fix at home. Find something you like and stay with it for a while. Do the same for lunch. This way you can be thinking about something else and not have your thoughts so focused on eating. Carry some healthy snacks with you, like carrots, celery, or apples, so you never get overly hungry. Develop a taste for water and carry a bottle of water with you. Make normal healthy eating a happy part of a good day (*Figure 20*).



**Figure 20.** Packing a healthy lunch of foods that you like is a good way to manage your weight.

Recognize that your other personal behaviors, such as how much you sleep, has an impact on your weight. Find ways to work within your environment to get adequate sleep. Make this a priority even if others about you are not as committed to it.

If you need to make changes, do you have family or friends who will support you? If you do and this is helpful to you, involve others in your quest for change. You may not only be helping yourself but may be a help to someone else in the process.

Above all, respect your body. Be happy with what you have been given. Realize that your biological mechanisms are amazing in their design to help you be healthy. Work with what you have rather than working against it. Everyone wants to be a healthy weight. As you commit to maintaining a healthy weight now and for many years to come, it will be a great joy to you.

## MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Recognize what is a healthy range of weight for your body type and size.
2. Calculate your BMI. Ascertain any unique qualities that impact your BMI.
3. Identify factors in your life that may lead to weight gain.
4. Increase your interest in physical activity by developing additional skills and capacities by which you can expend calories—and enjoy them!
5. Increase your understanding of what nutrition is best for your body.
6. Establish healthy environments for maximizing a healthy pleasure and joy of eating.
7. Do what you can to help others around you attain and maintain a healthy weight.

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## GLOSSARY TERMS

**Adipose tissue:** Tissue in the body that stores fat.

**Amenorrhea:** Absence of or infrequent menstruation.

**Anorexia nervosa:** An eating disorder characterized by refusal to maintain minimally normal body weight.

**Basal Metabolic Rate (BMR):** The energy needed by the body to sustain life while in a resting state; measured in calories.

**Binge eating:** Not just overeating, but an excessive consumption of enormous numbers of calories rapidly and in a short period of time.

**Body Mass Index (BMI):** A measure of body composition calculated by dividing your weight in kilograms by your height in meters squared.

**Bulimia nervosa:** An eating disorder characterized by bingeing and purging.

**Disordered eating:** A variety of abnormal eating behaviors that, by themselves, do not warrant diagnosis of an eating disorder.

**Ghrelin:** Natural appetite-stimulating hormone. **Purging:** Misuse of laxatives, diuretics, and other inappropriate ways to rid the body of enormous amounts of recently ingested calories.

**Healthy weight:** Weight range that minimizes health risks and feels good to the individual.

**Leptin:** Natural appetite-suppressing hormone.

**Obesity:** Extremely overweight; quantified by a BMI of 30.0 or more.

**Omentum:** A fold of the peritoneum (the membrane lining the abdominal cavity) extending from the stomach to adjacent abdominal organs.

**Overweight:** Having a body mass index that exceeds 25.0–29.9.

**Percent body fat:** The percentage of total body weight that is composed of fat.

**Underweight:** A person is underweight when his or her BMI is less than 18.5.

**Weight cycling:** Repeated weight loss and gain; "yo-yo dieting."

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Making Stress Work for You Effectively

# Am I Managing Stress?

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Day-to-day decisions are correlated with stress. Compared to major life changes, daily events may be even more stressful because they occur more frequently in our lives. All the demands on our time—trying to accomplish all that we do in a day, having so many opportunities at our disposal, living the fast-paced lives that we do—are basic to life in the 21st century. Then, if something goes wrong—we misplace a needed item, get a flat tire, have to wait in rush-hour traffic—little things that might not normally be a big deal may become a bigger deal because we live these jam-packed lives.



## After reading this chapter, you will be able to:

- › **DEFINE** stress and distinguish between bad stress and good stress.
- › **EXPLAIN** how your body responds to stress.
- › **IDENTIFY** the sources of distress.
- › **DESCRIBE** how stress can affect your health and list specific stress-induced disorders.
- › **EXPLAIN** strategies and techniques that you can use to manage your stress in a way that will benefit your life.



# Am I Managing Stress?

making stress work for you effectively

## WHAT IS STRESS?

Who said that being busy is better? When we give this some serious consideration, does it even make sense that someone's life is of more value or importance because they are stressed? It doesn't make sense. However, it is easy to get drawn into the thinking that if a person is busily engaged in something nearly every minute of the day, this constitutes a life of value. How often does someone greet you with, "How are you doing, are you busy?" What if you answered, "No, I don't do busy!" The person asking would probably think there was something wrong with you! From the standpoint of health and wellness, it certainly makes sense to be wise in your selection of daily activities and commitments.

Stress is a very interesting and fluid phenomenon. Many people use the word stress to mean both that which causes a response and the response itself. Technically, **stress** is the response when homeostasis is threatened, and a **stressor** is that which upsets homeostasis and causes stress.

## Distress and Eustress

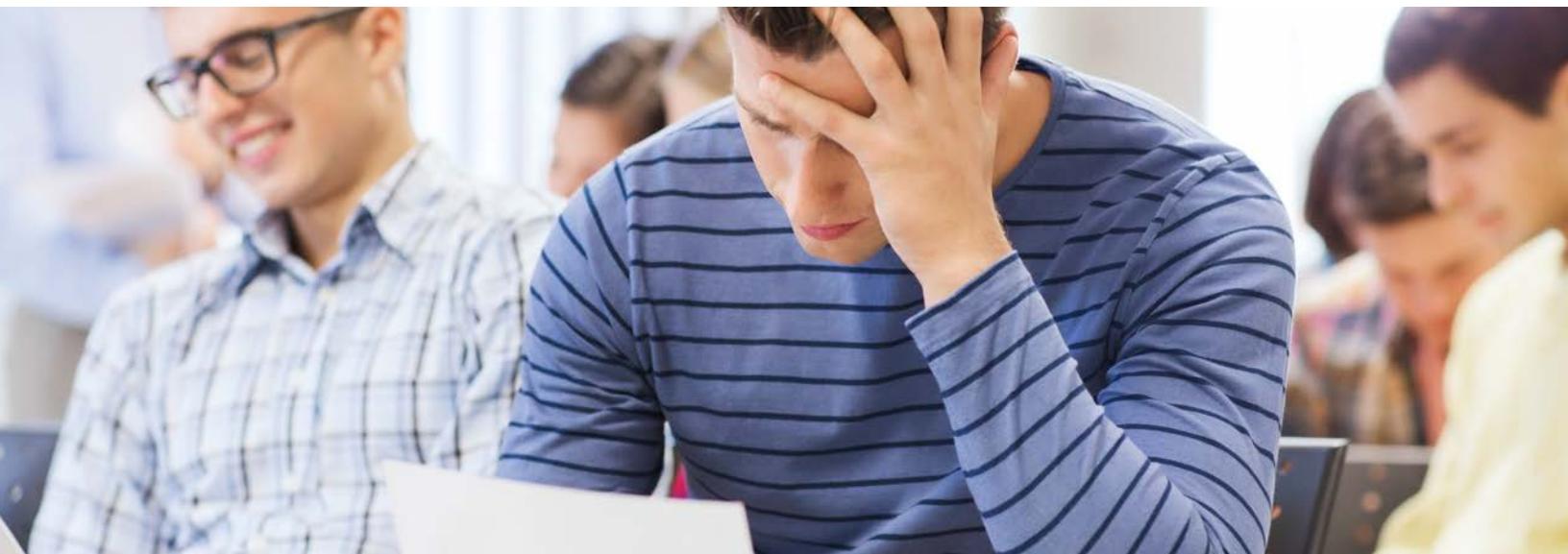
If you have a positive outlook regarding yourself and your life, you most likely seek challenges and opportunities for growth. You purposely put yourself in "stressful" situations. These experiences are often exhilarating and personally fulfilling. Researchers call this kind of stress **eustress**. You can live a full, engaging life and mostly avoid the negative effects of stress, enabling your mind and body to experience growth and progress from the positive stimuli you have chosen.

Unfortunately, the most common perception of stress is negative. Rather than the positive dynamic of eustress, ***distress*** can be very disruptive to one's health and life. Distress does cause one to experience the negative effects of stress. The whole environment of one's self is negative when experiencing distress (*Figure 1*). Although distress is negative, a person is still making a choice to be stressed. Often, we think of distress as something that happens to us, without our consent. It's easy to see eustress as something we choose but think of distress as something we don't choose. This tends to perpetuate a kind of victim mentality.



**Figure 1.** A positive attitude toward the challenges that come your way will help you change distress into eustress.

A fairly typical attitude might be that something or someone else is to blame for my discomfort. For example, one of your professors unexpectedly assigns a paper to be written next week. This is potentially stressful for everyone in the class. Some take it in stride and manage to find time to do a good job writing the paper. Others continue to blame the professor and become stressed, feeling they have no other choice. When we blame, we are still making a choice—we are choosing to believe that we don't have a choice—but that is still a choice (*Figure 2*)!



**Figure 2.** You can make a choice about how you look at potentially stressful situations.

Basically, what it boils down to is that our attitudes and motives are what constitutes whether stress is eustress or distress. For example, someone running for office seeks to be in front of the crowd, speaking to the voters. The candidate wants to be the one speaking, striving to gain the support and votes of the audience participants. The candidate is probably highly energetic and stimulated by the experience. For others, however, speaking in front of an audience is the most traumatic thing they could do. They would rather die than get up in front of all those people and be the center of attention. The situation is extremely stressful for them and brings much distress to that person's life—they could become terribly upset, even to the point of getting sick. Same situation, same environment, but the candidate is energized by it and the other person is devastated by it. One take on the experience is eustress, and the other take is distress.

## Stress and Homeostasis

We have a fairly constant barrage of life events that challenge our homeostasis. **Homeostasis** means keeping a balance of bodily processes such as heart rate, blood pressure, hormone levels, and many other physical processes. Historically, homeostasis has meant stability or "stasis" through the same or "homeo." The concept is that the balance point of these bodily processes is always the same. In the past several decades, a variation on the understanding of homeostasis has been coined—**allostasis**.

Allostasis is a balancing or stability (stasis) through variability or "allo." This newer concept says that the stability or stable point of bodily processes will vary depending on circumstances. Another key feature of allostasis is the recognition that the body may engage in the stress response prior to the occurrence of the stressor. This is because just contemplating the stressor or recalling a past stressor will initiate the stress response. Rather than reaching allostasis, the stress response itself becomes destructive and damages a person's health. This is called the **allostatic load**. This is when allostasis takes on a more significant meaning.

We are not going to eliminate stress in this fast-paced day and age. Stress is alive and well and all around us. Not many hours are spent in the rocking chair on the porch anymore. So, is it possible to live at this time in our civilization and not be negatively affected by stress? The answer is a resounding, Yes!

## Physiology and Stress

It would be a challenge to find any aspect of our being that is not affected by stress. After all, our mind and body are designed to survive and thrive. All systems of our body are affected by what troubles our mind, even the involuntary or autonomic ones.

### Fight or Flight

The stress response was first named the **fight or flight response** by Walter Cannon in 1915. It refers to the response of the sympathetic division of the **autonomic nervous system (ANS)** to prepare a person to respond to a threat. After Cannon first coined this term, Hans Selye, M.D., identified this initial stress response as the first of three stages of what he called **General Adaptation Syndrome (GAS)**.

The ANS is the part of the nervous system that maintains homeostasis. Most of its activity is involuntary and affects heart rate, digestion, respiration rate, salivation, perspiration, the diameter of pupils, micturition (the discharge of urine), and sexual arousal. Some functions of the ANS, such as breathing, work together with the conscious mind.

## Parasympathetic and Sympathetic Divisions

The ANS is comprised of the parasympathetic division and the sympathetic division, which are commonly referred to as the *parasympathetic* and *sympathetic nervous systems*. The parasympathetic and sympathetic divisions complement one another, modulating vital functions to achieve homeostasis (*Figure 3*). The sympathetic nervous system generates energy and arousal and inhibits digestion. The parasympathetic nervous system returns the body to its regular functioning by calming nerves and enhances digestion.

### PARASYMPATHETIC NERVES

Constrict pupils



Stimulate salvia



Constrict airways



Slow heartbeat



Stimulate activity of stomach



Inhibit release of glucose



Stimulate gallbladder

Stimulate activity of intestines



Contract bladder



Promote erection of genitals



CRANIAN NERVES

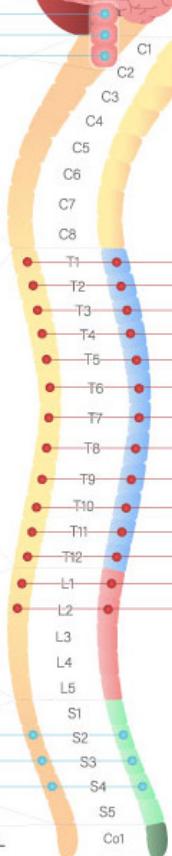
CERVICAL NERVES

THORACIC NERVES

LUMBAR NERVES

SACRAL NERVES

COCCYGEAL NERVES



### SYMPATHETIC NERVES

Dilate pupils



Inhibit salivation



Relax airways



Increase heartbeat



Inhibit activity of stomach



Stimulate release of glucose  
Inhibit gallbladder



Inhibit activity of intestines



Adrenaline production



Relax bladder



Promote ejaculation and vaginal contractions



**Figure 3.** The sympathetic and parasympathetic nervous systems.

Following are some specific actions of the *sympathetic* nervous system:

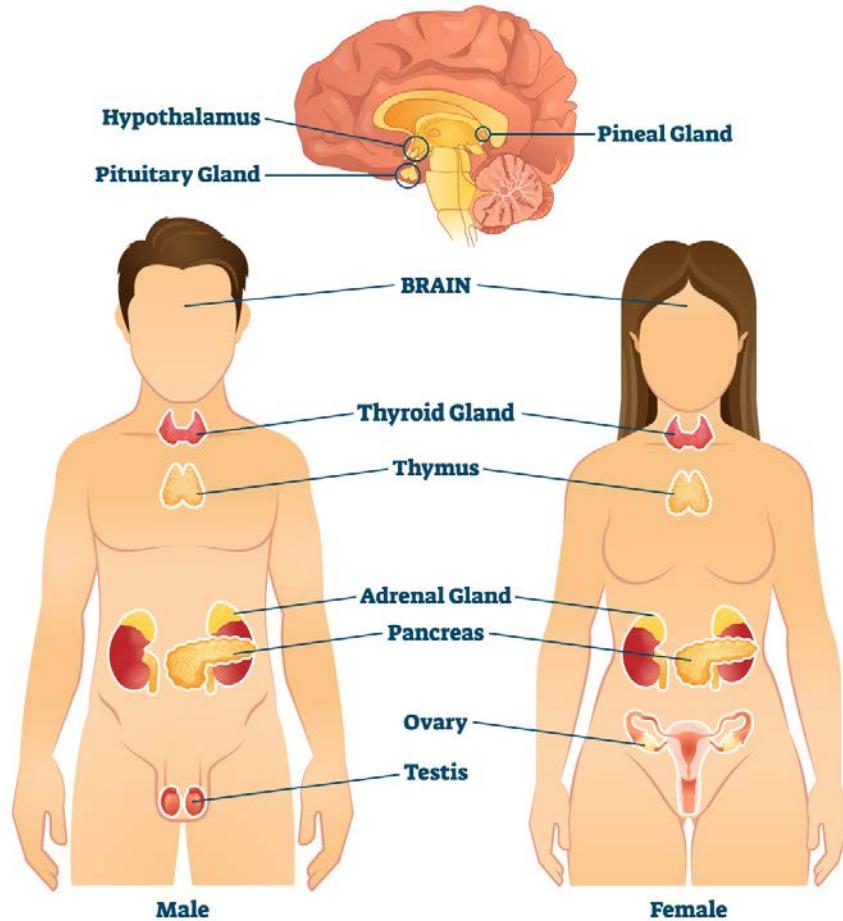
- Diverts blood flow away from the gastrointestinal tract and skin by way of vasoconstriction.
- Enhances blood flow to skeletal muscles and lungs.
- Dilates bronchioles of the lung, allowing for greater alveolar oxygen exchange.
- Increases heart rate.
- Dilates pupils, allowing more light to enter the eye.

Following are some specific actions of the *parasympathetic* nervous system:

- Dilates blood vessels leading to the gastrointestinal tract, thereby increasing blood flow.
- Constricts bronchial diameter when the need for oxygen has diminished.
- Returns pupils to their normal size.
- Stimulates salivary gland secretion and the absorption of nutrients, enhancing digestion.

## Endocrine System

The nervous system works closely with the endocrine system of glands, tissues, and cells that releases hormones to regulate body functions (*Figure 4*). A hormone is a chemical messenger that regulates the activities of cells. Actions of the sympathetic nervous system release key hormones and **endorphins** (morphine-simulating brain secretions that inhibit pain), mainly epinephrine (adrenaline) along with **cortisol**. Cortisol is the main glucocorticoid in the body, known as the stress hormone. **Glucocorticoids** are steroid hormones involved in glucose metabolism and are manufactured by the adrenal glands.



**Figures 4.** The nervous system works with the endocrine system which releases hormones to regulate bodily functions.

**Epinephrine** increases blood pressure, heart rate, and energy supplies. **Norepinephrine** works throughout the body to ready it for emergencies. **Corticotropin-releasing hormone (CRH)** is produced in the brain and stimulates the pituitary gland to release **corticotropin (ACTH)**, which in turn causes the release of cortisol by the adrenal glands. Cortisol enhances the brain's use of glucose and inhibits functions such as digestion, immune functioning, and other systems not required in the fight-or-flight response. This is a prime example of the complex interplay of the mind and body functioning as one entity.

## HOW THE BODY RESPONDS TO DISTRESS

We all respond differently to stress, but there are also some common responses. Would you say that distress affects you more physically, mentally, or emotionally? Do you have physical sensations such as a headache, or does your stomach feel as if it is in knots when you are distressed? Do you tend to blame others or the situation? Do you get angry and want to fight? Do you find an escape? Does distress leave you fearful or down on yourself? Do you withdraw from others or get depressed? Before we address ways to deal with distress, let's examine the General Adaptation Syndrome (GAS) and the various physiological effects stress has on all of us.

### General Adaptation Syndrome

The stress response is designed to be self-regulating. We are fired up when we need to be, and then return back to normal after the challenge is over. In his popular book, *The Stress of Life*, Dr. Hans Selye, known as the “father of stress research,” described stress as “the nonspecific response of the body to any demand.”<sup>1</sup> He described a stress syndrome of changes in the structure and composition of the body as the General Adaptation Syndrome, or GAS. The GAS consists of three stages:

1. **ALARM.** Also known as fight-or-flight, this alarm reaction is the sympathetic nervous system and accompanying glandular responses to some trauma or challenge. This can even be triggered just by thoughts or remembrances of past traumatic events (*Figure 5*).
2. **RESISTANCE.** This stage calls on the immune system to sustain the individual during continued stress. As the stress subsides, the systems return the person to normal functioning. If the stress does not subside, a person will enter the third stage, the stage of exhaustion.
3. **EXHAUSTION.** Changes in the body similar to the alarm reaction may occur as the body is in a desperate state trying to survive. When systems are depleted because of overwhelming pressure placed on them, eventually the mechanisms of the body completely wear out and the person dies.

Usually, stressors will only produce the first two stages. Even though the GAS is a syndrome that sees the whole picture, it is evident that specific changes are occurring during each of these stages.

Selye acknowledged that centuries ago even Hippocrates, the father of medicine, realized that “disease is not only suffering (pathos) but also toil (ponos) that is the fight of the body to restore itself toward normal.” This thinking is similar to that of immune researchers today who are illuminating the power we have to heal from within ourselves. Selye often spoke of stress as the wear and tear on the body as we respond to the demands of life.



**Figure 5.** Even the memory of a past traumatic event can trigger the first stage of GAS—the alarm or fight-or-flight stage.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Seeing the Whole Person

While a medical student at the University of Prague in 1925, Selye was being taught to look for specific manifestations of diseases. However, he observed that a wide range of disease-producing factors seemed to be producing more similar responses than specific responses to each disease. Early in his education, he had the ability to comprehend what was happening to the whole being and envision the larger picture rather than focusing on the analytical or minute details. Dr. Selye never coined a term such as mindbody, but his way of thinking was certainly to see the whole person functioning in this manner.

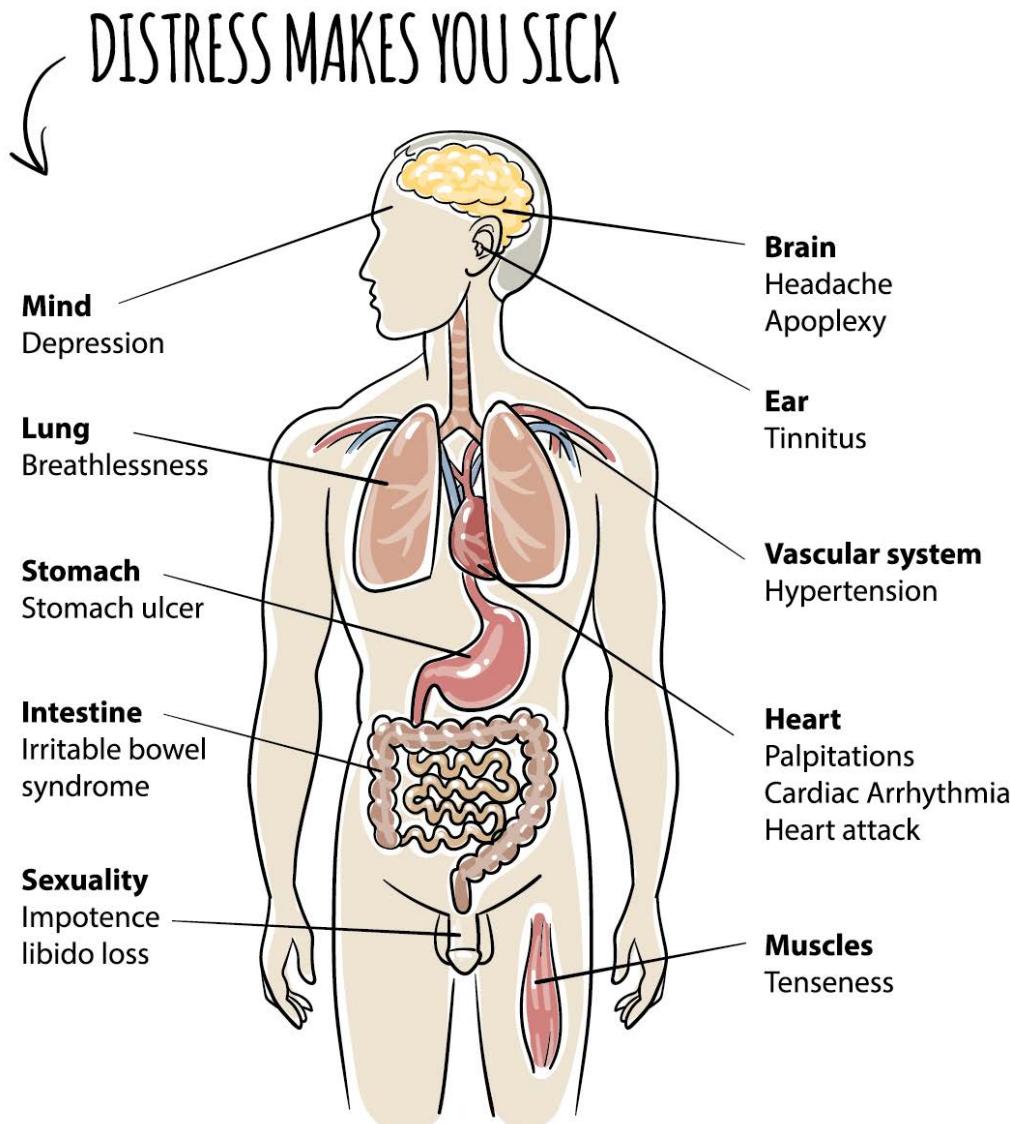
For all the good that Dr. Selye's research has done, recent discoveries have pointed out an error in his thinking. Selye believed that in the third stage of the GAS, the stage of exhaustion, the hormones fighting the stressors simply were depleted or exhausted. Dr. Ronald Sapolsky, a leading neuroendocrinologist and professor of neurology and biology at Stanford University, has concluded that it is not so much that the stress response runs out, but rather, with sufficient activation the stress response can become more damaging than the stressor itself, especially when the stress is purely psychological.<sup>2</sup> This is a critical concept because it underlies the emergence of much stress-related disease. The damage caused by the stress response is the allostatic load introduced earlier in this chapter. Rather than returning the body to a balanced state, the long-term or chronic stress response eventually becomes that which harms the individual.

# Psychoneuroimmunology and Stress

With advances in our understanding of the **immune system** and neuroscience, many researchers have been discovering how our body's systems are affected by mind as well as body, and therefore by stress.

However, psychoneuroimmunology (PNI) researchers do not see stress as solely negative and are quick to observe the role of eustress in our quest for healthy living. In fact, stress is not a popular term among psychoneuroimmunologists who prefer the concept of psychosocial factors in disease. PNI research does acknowledge that distress can be very debilitating. However, PNI emphasizes that stress does not automatically cause disease, but can actually be a positive influence in living a healthy life. According to Dr. Margo deKooker, "what this means is that we are not victims of our personality or circumstances, but that we are able to create new health-enhancing patterns which will shift our focus away from disease and towards living fully."

Of course if or when we get sick is often completely beyond our control, but our response to stress does matter to our health (*Figure 6*). This brings us back to the premise that, depending on our motivation and perspective, stress can be eustress or distress. Also, through advanced immune research, we can see tangible evidence of the mind and body functioning as a whole. It is clear that immune cells produce information chemicals that can regulate mood or emotion.



*Figure 6. How we respond to stress matters to our health.*

# Nonspecific Immune Response

Dr. Steven Maier, University of Colorado Distinguished Professor and the Director of the Center for Neuroscience, focuses much of his research on the brain and the immune system and understanding stress. He has discovered what he calls the nonspecific immune response or “sickness response. Macrophages, the first line of immune cell defense when the body experiences infection, stimulate the production of the pro-inflammatory cytokines, specifically interleukin-1, interleukin-6, and tumor necrosis factor alpha. Pockets of neurotransmitters located on the vagus nerve, called paraganglia, have receptors for these cytokines. They, in turn, activate the vagus nerve to make its own interleukin-1, which sends signals back to the immune system and sets off the sickness response.

Dr. Maier has discovered that this neural loop, which occurs as we try to deal with infection, is the same neural loop that gives us the classic fight-or-flight response. Maier concluded that “stress is another form of infection.” This leads us to consider that distress is a form of getting sick in the same way that a virus such as the flu takes over our whole body (*Figure 7*).



**Figure 7.** Mood and emotions have been found to be part of the body's immune response.

If that weren't enough of a realization, Dr. Maier has proven that mood and emotions are all part of this neural loop as well. According to Maier, “understanding this dualfunction circuitry may help psychologists better understand depression. In fact, depressed mood produces all the same behavior changes as both the sickness and stress responses.” Maier found that patients receiving interleukin-1 to fight cancer developed severe depression, and people with depression have elevated cytokine levels.

These exciting discoveries make the mindbody integration so real, so apparent. And isn't it fascinating that the communication is not just one direction, emotions and mind to immune cells, but also the reverse—immune cells to mind and emotions?

# SOURCES OF DISTRESS

Now that we have explored our body's stress response mechanisms, we can brace ourselves to identify sources of distress in our lives. Considering the many sources of distress isn't a pretty picture, yet it is one with which we are all familiar.

## Measuring Distresses

Highly sophisticated methods for measuring stress that are used in laboratories and hospitals, such as electroencephalography (EEG) and imaging techniques, show specific changes in the brain, cardiovascular, and electrodermal responses to stimuli and changes in sympathetic and parasympathetic balances. However, the most commonly used measures of stress, and far more cost-effective, are questionnaires. Because the questionnaires rely on self-reporting, they are certainly less scientific than the laboratory measures. However, some of these self-report measures have been proven to be quite effective. For years, the gold standard in the self-report questionnaires measuring stress has been the Holmes-Rahe scale that focuses on stress levels accompanying life changes.

Dr. Tom Holmes and Dr. Richard Rahe published their stress assessment tool in 1967. Initially, Dr. Rahe identified life changes that had a negative impact on a person's health. Dr. Rahe developed the life change unit (LCU) concept so that it was possible to discern the severity of the impact of a certain life change.

During his medical residency, he measured the reported life changes of his colleagues and correlated these with the residents' health. The higher the LCU score, the greater were the number of reported illnesses. Residents who scored below 150 in life change totals were basically healthy, whereas those who scored between 150 and 300 reported one or two minor illnesses. Those scoring over 300 had frequent minor illnesses and some severe illness within the following year. Dr. Rahe discovered a clear correlation between 42 identified life changes and illness (*Figure 8*).



**Figure 8.** Distress can be brought on by a variety of life events, choices, and situations.

Interestingly, people are still using this gold standard scale as a measure of the causes of stress today. The current [Holmes-Rahe scale](#) can be found on the American Institute of Stress (AIS) website. Take a look and note the specific life changes that have been identified as being associated with distress and the severity of that distress. Have any of these life changes been stressful for you?

Hopefully, identifying those life changes that are considered sources of stress will help you to put these factors in a proper perspective. You may have experienced one of these life changes and believed it was commonplace, that it was not stressful to most people. Seeing where it ranks on this inventory of life changes may reshape your thinking. A certain life change may be considered far more stressful by others than by yourself and, of course, the reverse could be true. Living in our society, it is intriguing to be aware of what life changes people generally consider stressful. Does the rating of any of these life changes surprise you? Do you find any that are not consistent with your experiences or attitudes?

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# American Institute of Stress (AIS)

The American Institute of Stress (AIS) was established in 1978 as a clearinghouse for stress-related research and ideas. The impetus for its formulation came from Dr. Hans Selye. According to the AIS website ([www.stress.org](http://www.stress.org)), other founding members included Linus Pauling, Alvin Toffler, Bob Hope, Michael DeBakey, Herbert Benson, Ray Rosenman, and other prominent physicians, health professionals, and laypersons interested in the relationship between stress and quality of life and health.

The AIS gives an annual award to recognize outstanding contributions in the improved understanding of stress. The AIS's highest award, named after Dr. Hans Selye, was given to Richard Rahe, M.D. in 2007. Rahe has been actively identifying sources of distress for over 40 years.

## Contemporary Life Distresses

In addition to life changes, we have the challenge of conducting our lives within our modern society. Today we are confronted with threats of terrorism, pandemics, and other life-threatening global issues. Rapid communication, computers, and advances in transportation have greatly increased the pace of life. We have instant access to events in nearly every corner of the globe. The support of family is not what it used to be for many and social media may be all consuming (*Figure 9*). Financial challenges are rampant. Morals have declined so that what was once considered promiscuous is now generally accepted. Crime, violence, and even natural disasters have increased in quantity and severity.



**Figure 9.** Social media can help connect us, but it can also consume us and cause distress.

These adverse conditions make it all the more imperative that we find within ourselves the ability to not only cope but to thrive. Because we have so many potential sources of distress today, it is not simply whimsical to think in terms of eustress. Making eustress a life goal could be one of the most important wellness decisions we make.

## Occupational Distress

Even though we have more labor-saving devices today and can do just about everything more efficiently than in times past, we have more time pressures on a regular basis. Jobs are placing more demands on people so that many feel pushed and stretched to do more and more. Additionally, with the collapse of retirement funds of major corporations and governments, people have to establish other avenues of saving to have a secure financial future.

The National Institute for Occupational Safety and Health, a division of the Department of Health and Human Services, conducts surveys having to do with stress in the workplace. The data collected since the turn of the century show definite increases in perceptions of occupational stress. Three-fourths of employees reported that workers have more on-the-job stress than workers did a generation ago. Over 30 percent report they are very stressed due to their work and 26 percent said they are very often “burned out” by their work (**Figure 10**).



**Figure 10.** Job stress has been on the rise for several decades.

Currently, job stress is often associated with health complaints. The majority of accidents on the job are stress-related. Workers' compensation claims for mental stress have increased exponentially with awards averaging over \$3,500. Repetitive musculoskeletal injuries such as carpal tunnel syndrome have become a leading health care cost. Absenteeism due to stress is said to have tripled with an estimated one million workers in the nation absent every day because of stress.

The American Psychological Association 2021 Work and Well-being Survey found that because of stress in the workplace two in five employees will be seeking work outside their company in the coming year. Seventyone percent of the respondents said they feel stressed at work everyday. Upper-level employees with a good education had far more favorable attitudes toward their employment than lower-level employees. If only one perk could be added, 33 percent said they would like more money. Other responses included more flexible hours and more breaks during the day.

## Financial Distress

Financial matters are also rated as highly stressful. Although many will experience some level of economic hardship in their lives, the key to eliminating stress in financial matters is to live within your means.

Debt really is a form of bondage. It is difficult to feel free when in debt to someone or some company. It is understandable to go into debt to receive an education, to secure a place to live, and for transportation, but excessive spending beyond our means for these items and for consumer goods, entertainment, and luxuries is a leading cause of distress in people's lives (*Figure 11*).



*Figure 11.* Living within one's means is one of the best ways to manage financial stress.

Financial pressure is also a leading cause of marital problems and breakups. A study of 1,010 couples ages 20–30 reported that 70 percent of the couples reported having consumer debt, 55 percent had automobile debt, and 48 percent had credit card debt. There was significantly more marital satisfaction reported by couples with no debt, and less marital satisfaction reported in relation to the amount of debt starting with \$1,000 and up to \$50,000 (*Figure 12*). Those who attended college and also took a marriage relations class had less debt than those who didn't. Other larger studies have reported similar results.

Your ability to stay out of consumer debt will be a great asset to your future. It may very well be that you will not enjoy the same level of economic prosperity as the family in which you were raised, but that does not mean you must be unhappy and distressed. This is a time in which a realistic adjustment of financial expectations may be required of each of us.



**Figure 12.** Marital dissatisfaction has been found to increase as a couple's debt level increases.

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# Self-Talk and Stress

A good deal of distress may come from ourselves due to our own insecurities. Some distress may result from a lack of confidence in our abilities. However, more severe distress arises from believing that we personally are not of value, that we are not good enough nor ever can do enough to receive the approval we seek (*Figure 13*). This kind of thinking can become so problematic that it can actually be categorized as addictive. This kind of negative self-talk can poison all of our relationships. This is a particularly sensitive area because clearly, one of the antidotes to distress is to have solid, supportive friends and family.



**Figure 13.** We can be our own worst enemy when we engage in negative self-talk.

## Relationship Distress

In his book *The Real Age Makeover*, Michael F. Roizen, M.D., says this about relationships: "Being sociable is good for your health. People who live with others, have lots of friends, and stay involved in religious or social activities live longer, healthier lives." The key is to form positive relationships. Just being social is not enough if it adds negativity and pressure in your life (*Figure 14*).



**Figure 14.** One of the keys to a healthy life is having positive, loving relationships with friends and family.

For decades, studies have verified that happily married couples outlive those in unhappy marriages or single people. Lonely people have a 25–30 percent higher risk of dying prematurely than people with supportive relationships. People who are happier have less risk of developing fatal cancers. In one study from Stanford University, women fighting breast cancer who joined a support group lived twice as long as patients who didn't join a support group. Researchers at Rush University Medical Center in Chicago reported that negative emotions and a lack of social support increase a person's risk of developing heart disease.

Just as pessimism suppresses the immune system, so do hostile environments. Enduring poor communication in relationships or on the internet, suppressing emotions, or having to deal with anger or any form of abuse tends to weaken our immune system and lead to various stress-related illnesses.

## College Life Distresses

Morehead State University developed an adaptation of the Holmes-Rahe Life Event Scale for use with college students. It is a 31-item scale named the Student Stress Scale. Items in their scale that apply especially to college students include

- Failure of an important course
- Serious argument with close friend
- Sex problems
- Change in scholastic major
- Change in financial status
- Trouble with parents
- New girlfriend or boyfriend
- Increase in workload at school
- Outstanding personal achievement
- First quarter/semester in college
- Change in living conditions
- Serious argument with an instructor
- Lower grades than expected
- Change in sleeping habits
- Change in social activities
- Change in eating habits
- Chronic car trouble
- Change in the number of family get-togethers
- Too many missed classes
- Change of college
- Dropping more than one class
- Minor traffic violations

An earlier study published in the *College Student Journal* reported that students tend to be more stressed by daily hassles than significant life events. The top five daily hassles for students included changes in sleeping habits, vacations/breaks, changes in eating habits, increased workload, and new responsibilities.

Other particular sources of distress for college students might be decisions regarding alcohol or drug use, balancing class work and job responsibilities, dealing with homesickness, battling depression, struggling with disordered eating, and dealing with test anxiety. With many options open to you, it may also be a challenge to choose how to spend your time wisely and not get over-involved in campus activities. Of course overusing electronic devices can also become a drain on time.

Some students find decisions about what to do in the future, what career to choose, whom to marry, and where to live to be quite distressful. But rather than viewing all of these new dimensions of life with a sense of worry and fear, now is a great time to see them as exciting challenges and opportunities for you to chart your destiny (*Figure 15*).



*Figure 15. The decisions you face about your future are positive opportunities to shape your life!*

## STRESS-INDUCED DISORDERS

The AIS reports numerous disorders attributed to stress including “depression, anxiety, heart attacks, stroke, hypertension, immune system disturbances that increase susceptibility to infections, a host of viral linked disorders ranging from the common cold and herpes to AIDS and certain cancers, as well as autoimmune diseases like rheumatoid arthritis and multiple sclerosis.” Stress has also been identified with disorders of the skin, the digestive system, Parkinson’s disease and other degenerative neurological disorders, and insomnia. As we develop a greater understanding of the negative impacts of stress in our lives, it is difficult to think of any condition or disorder that would not be exacerbated by distress, yet the following are some commonly affected systems.

### Cardiovascular Dysfunction

Psychological stress wreaks havoc with the cardiovascular system because this system is so intimately involved in the stress response. Without diving too deep into the dynamics of the cardiovascular system response to stress, just note that undue stress on the cardiovascular system leads to a breakdown or wearing down of these vital functions.

### Diabetes

Adult onset or type 2 diabetes has reached epidemic proportions in America and is now being diagnosed in children and teenagers as well. About two-thirds of American adults are overweight or obese. Chronic stress sends glucose and fatty acids into the bloodstream. Stress eaters also tend to crave sweets and starchy foods rather than healthy foods, which eventually can lead to type 2 diabetes. The combination of added stress and weight gain is proving lethal not only for Americans but is also becoming a worldwide health concern.

## Irritable Bowel Syndrome

Irritable bowel syndrome (IBS) is commonly associated with stress, which makes sense when you consider the nature of the stress response (*Figure 16*). The digestive system is directly affected by and is prone to malfunctioning due to chronic stress. Ulcers are one of the earliest detected psychosomatic disorders and have long been associated with stress. A recent finding is that the bacterium *Helicobacter* is related to ulcer development, but only in the context of its interactions with other factors, including stress.



*Figure 16.* Irritable bowel syndrome is one of many physical ailments that can be caused by too much stress.

## Chronic Low-Level Anxiety

It is generally estimated that well over 50 percent of visits to doctors today are due to stress-related problems. At some point in our lives—and the sooner the better—we will be challenged with becoming aware of the anxiety level with which we live. Other than major traumas, distress is often an accumulation of a number of things that keep our fight-or-flight mechanism engaged and renders the parasympathetic “return to resting” to be less and less effective. What this translates into is a constant state of low-level anxiety that negatively affects our personal choices, relationships, occupations, and society-at-large.

Living with continuous low-level anxiety is the path to chronic stress and eventual allostatic load. If we live in this low-level anxiety mode long enough, it may be quite difficult to learn to relax and unwind. We will need to make a conscious effort to restore balance in our lives.

## MAKING STRESS WORK FOR YOU

In the process of seeking life-balance, we are actually putting ourselves on the path to eustress, the good stress. Will you be instrumental in helping to get us out of this age of distress, and away from the tendency to think that life and stress is “just what happens” to us? Wouldn’t it be great to move into the age of eustress? There is evidence all around us of the positive effects of the mindbody approach to life—in medicine, sports, the corporate world, and so many other areas of life. We can do this! The following are some additional ideas for achieving this balance.



**Figure 17.** Plan and take regular downtime to relax and recharge.

## The Power of Full Engagement

For decades, psychologist Dr. Jim Loehr has helped top athletes, particularly tennis players, achieve their highest performance. A unique aspect of his approach is the recognition of the advantages that can be gained during relaxation or downtime (*Figure 17*). He has put as much, if not more, attention on recovery than on exertion. This 21st-century concept is all about eustress! Dr. Loehr writes, "Stress is not the enemy of our lives. Paradoxically, it is the key to growth... We build emotional, mental and spiritual capacity in precisely the same way that we build physical capacity. We grow at all levels by expending energy beyond our ordinary limits and then recovering." This eustress thinking enabled Loehr to conceptualize a new paradigm in which energy, not time, is our most precious resource (*Table 1*).

**Table 2. The New Paradigm of the "Power of Full Engagement" Compared to the Old Paradigm**

OLD PARADIGM	NEW PARADIGM
Manage time	Manage energy
Avoid stress	Seek stress
Life is a marathon	Life is a series of sprints
Downtime is wasted time	Downtime is productive time
Rewards fuel performance	Purpose fuels performance
Self-discipline rules	Rituals rule
The power of positive thinking	The power of full engagement

The more we take responsibility for the energy we bring to the world, the more empowered and productive we become. The more we blame others or external circumstances, the more negative and compromised our energy is likely to be. If you could wake up tomorrow with significantly more positive, focused energy to invest at work and with your family, how significantly would that change your life for the better?

Following are the four main principles of the power of full engagement according to Dr. Loehr:

- Full engagement requires drawing on four separate but related sources of energy: physical, emotional, mental, and spiritual.
- Because energy capacity diminishes both with overuse and with underuse, we must balance energy expenditure with intermittent energy renewal.
- To build capacity, we must push beyond our normal limits, training in the same systematic way that elite athletes do. We must build emotional, mental, and spiritual capacity in precisely the same way that we build physical capacity.
- Positive energy rituals—highly specific routines for managing energy—are the key to full engagement and sustained high performance. A positive ritual is a behavior that becomes automatic over time, fueled by some deeply held value.

## Logotherapy

One of the most astounding accounts of finding positive meaning amid the worst of human suffering is that of Dr. Viktor Frankl in his book *Man's Search for Meaning*. The first part of the book recounts his experiences in the concentration camps during the Holocaust. In the second part, Frankl presents the approach to psychotherapy that he developed and named logotherapy.

Logotherapy is a form of psychotherapy that focuses on the “will to meaning.” The underlying premise is that each human life has inherent meaning—everyone has a purpose. Frankl taught that “everyone has his own specific vocation or mission in life; everyone must carry out a concrete assignment that demands fulfillment. Therein he cannot be replaced, nor can his life be repeated; thus, everyone’s task is unique as is his specific opportunity to implement it.” As to suffering, he often quoted Nietzsche who said, “He who has a why to live for can bear with almost any how. That which does not kill me, makes me stronger.”

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# Man's Search for Meaning

Frankl survived one of the worst atrocities of man’s inhumanity in the history of civilization and came out of it with love, meaning, and purpose in his heart, rather than bitterness, hatred, and feelings of revenge. His life has been extraordinary and his effect for good profound. His book, *Man's Search for Meaning*, has been an inspiration to millions of people throughout the world. A survey conducted in 1991 by the Library of Congress and the Book-of-the-Month Club indicated that the book belongs to a list of the 10 most influential books in the United States. Frankl truly did turn tragedy into purpose.

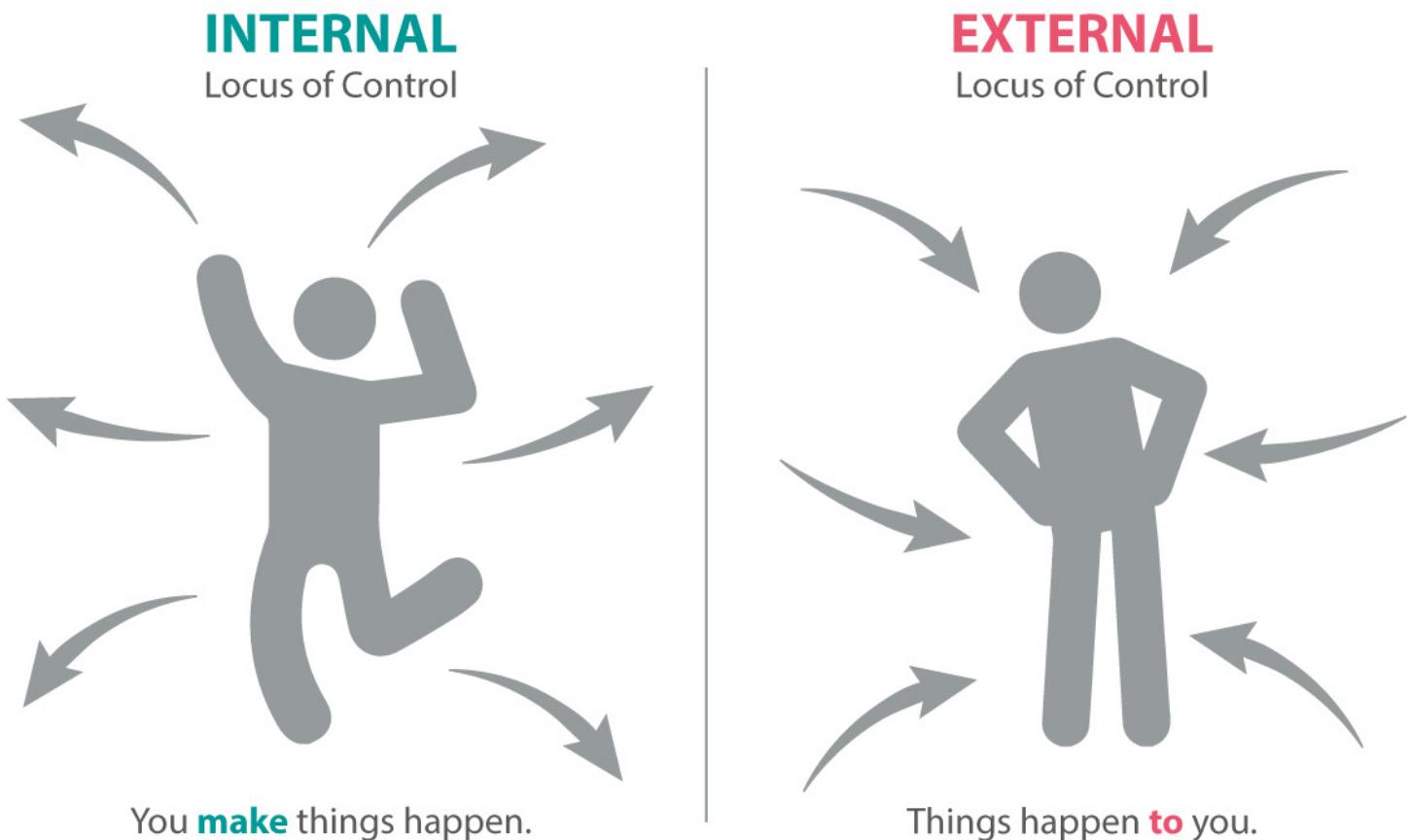
When we take his understanding of the meaning of each life to heart, we will realize at a deep level in our hearts the value of each life, especially our own. We will have a foundation from which to experience life that is imbued with purpose and dignity. With an assurance of meaning at the core of each of us, we may have peace about ourselves that cannot be threatened. This attitude will preserve for us a reservoir of calm and purpose amid the great storms of life, just as it did for Frankl.

How do we do this? How do we proceed to find our own personal value and purpose? A good place to start is analyzing our locus of control.

## Locus of Control

The locus of control one chooses, or how much control one believes they have over their life, is fundamental to a life without distress. Distress often comes with the perception that circumstances and life events give us our identity. The external events become a source of our internal thinking. As long as we approach life in this way, peace will not be with us. This is an external locus of control. Those outside influences actually define us. Living in this way is about as stressful as life gets.

Shifting to an internal locus of control, recognizing that our identity and the meaning of our lives comes from within, shifts our stress from distress to eustress. We actually believe and trust that life is our responsibility. We ask ourselves: What does life expect of me? What is my unique meaning, purpose, destiny? What am I to be and do that no one else can be and do? I am free to choose. There is no outside force coercing me to be something or someone I am not. I am capable of living a life that will contribute to the wellbeing of others (*Figure 18*).



**Figure 18.** Do you let outside events define you, or does your identity come from within?

Taking this internal locus of control perspective requires wisdom. Taken to an extreme, it may cause us to become very perfectionist in our behavior—we may expect everything we do to be free of mistakes, and we may feel that we control every decision, every event, or every outcome. Of course, this is not possible. However, an internal locus of control will always be positive if we keep a healthy perspective and not get out of balance or too extreme. We will realize that making mistakes and having challenges are part of life. We take responsibility, we strive to be grateful for life and content with what we have been given, and in all this, try to do the best we can to fulfill our destiny and make the world a better place. We accept that striving to do our best is what is most important, and it is up to us.

## Biofeedback

**Biofeedback** is a term that is used to describe measures of signals sent out by the body. In essence, biofeedback allows you to listen to your body. It is like having a window to see what is happening inside of you. Biofeedback helps you to control autonomous processes. This may seem contradictory—how can we control bodily processes that are automatic?

Biofeedback is often used by doctors and psychologists to treat certain ailments. Clinical biofeedback is used to treat blood pressure problems, headaches, digestive problems, problems with the heart, and also problems with muscles and movement. Biofeedback instruments can measure brainwaves, heart function, breathing, muscle activity, and skin temperature (*Figure 19*). The results help the patient learn how to change his or her own physiological responses and activity to improve health and performance. According to the Association for Applied Psychophysiology and Biofeedback (AAPB), biofeedback along with changes in thinking, emotions, and behavior may result in physiological changes that are lasting and eventually do not require the use of instruments.



**Figure 19.** Biofeedback allows us to look within ourselves and make lasting changes.

We have many practical measures of fitness activity today giving us biofeedback on daily activity, sleep patterns, caloric expenditure, and heart rate. Heart monitors and other wearable fitness measures send biofeedback to phones, tablets, and computers and get us used to paying attention to the signals we are receiving. The increased awareness we have available today due to advances in technology provides incentives to make healthy choices.

# Physical Activity and Exercise

Intermittent exercise and relaxation is a very effective method to improve cardiovascular capacity. However, the positive benefits go way beyond this. Consider that every time you work out, you are experiencing the lowering of your pulse rate possibly 12 to 15 times. With enough practice and experience, you begin to formulate a motor skill of relaxation. You are training or retraining the parasympathetic response, thus moving yourself out of the commonly endured low-level anxiety state.

The intent of the intermittent exercise and relaxation is to achieve a balance between the sympathetic and parasympathetic nervous systems. You are actually using the exercise to bring about relaxation. Many people prefer this active relaxation to the popular passive relaxation. Once developed, you can call on this relaxation skill in times of anxiety or pressure. Putting yourself in a state of calm at significant times may result in vastly improved performance and health.

Physical activity and exercise should be a joyous undertaking in your life. The more regularly you can be physically active, the better. Being in good shape helps to alleviate the negative effects of the stress response and helps you to recover homeostasis or allostasis more quickly and efficiently (*Figure 20*). Just as the key to good social support is to develop relationships that bring you happiness, the same holds true for physical activity. There must be something that you really enjoy doing—make it fun, not drudgery!



**Figure 20.** Physical activity is an effective way to manage your stress, and you can have a lot of fun doing it.

Many studies report that exercise helps to improve mood and offset depression. Getting outdoors and into the sunshine also helps lift one's mood. Being active gives a person a sense of satisfaction and accomplishment. This can occur with just a good walk or learning a new skill. Do you do stretches? For some, this is an excellent way to relax as well.

Just be aware that exercise and physical activity could be a stressor. If you are prone to living with low-level anxiety and then embark on intense steady-state exercise, you may just add to your distress. Use your best judgment and choose your activities wisely. There must be something that involves exercise and relaxation that you really enjoy doing. Find an activity that is joyful for you and reap the benefits.

# Additional Relaxation Ideas

Wait, don't skip this part! This could be one of the most needed of all these suggestions for living a healthy lifestyle. Relaxation may not be valued by many people in our culture at this time—if it were, would we have to deal with such serious stress-related issues? Probably not. The biggest challenge could be simply going against the grain and deciding that you *do value* relaxation. Is there anything you already do to help wind down? Music, dancing, walking, talking with friends? Playing video games consumes a lot of valuable time for college students and may not be all that relaxing. If this is what you are doing for downtime, you may want to reconsider your choices.

## Progressive Relaxation

Most people have tried *progressive relaxation* and find it very helpful. Find a comfortable position after making your environment calm with things like soothing music, lowered lights, and maybe even some fragrances that are appealing and relaxing. There are many audio recordings available that take you through a guided relaxation session. When you are comfortable, tense a muscle group and then relax it. Do this for the muscles throughout your body—thus the name progressive relaxation.

## Visualization

Combine *visualization* with your progressive relaxation. Can you remember a particular time that was especially beautiful? A sunset, the ocean waves, a vista on top of a mountain? Take yourself back to that place in your mind. Or make up a new place by picturing it in your mind. See the colors, the breathtaking beauty; feel the breeze on your face. Let all your senses be involved in experiencing this beautiful moment.

You may have an especially happy memory. Let this fill your mind and your heart. Transport yourself to this happy place, to these uplifting feelings. While you are doing this, your parasympathetic nervous system will be very happy. Your sympathetic division probably will, too, because it will slow down for a change. Maybe a better name for this is pampering your parasympathetic self!

## Deep Breathing

Pay attention to your breathing as you do your visualization. Practice being aware of your breathing while you are trying to relax. When you do this at a time you can concentrate, it will help you develop a skill that you can use during distress. Breathing is an important aspect of maintaining a sense of calm (*Figure 21*).



**Figure 21.** Simple, slow, deep breathing is a wonderful way to relax.

Here is a breathing exercise that Dr. Andrew Weil teaches. This breathing technique is from an ancient yogic tradition:

1. Place your tongue in the yogic position, touching the tip of your tongue to the inner surface of the upper front teeth, resting it on the alveolar ridge between the teeth and the roof of the mouth. Keep it there during the whole exercise.
2. Exhale completely through the mouth, making an audible sound. Then close your mouth and inhale quietly through your nose to a (silent) count of four.
3. Hold your breath for a count of seven.
4. Exhale audibly through the mouth to a count of eight.
5. This constitutes one breath cycle. Repeat for a total of four cycles, then breathe normally.
6. As you practice this exercise, you will be able to slow it down, which is desirable.  
Do it at least twice a day.

## Massage

Touch is basic to good health and happiness. Numerous studies show that if babies do not receive physical touch and nurturing, they may experience ill effects comparable to those that come from not being given adequate nutrition. Touch is basic to life. Cornell University researcher Diane Ackerman points out that massage therapy—the act of reaching through the holes in isolettes to stroke and massage premature babies—literally saves their lives. Eight months after being released from the hospital, the preemies who benefited from massage therapy are healthier, have better weight gain, and have fewer physical problems than the infants who were not touched regularly. For adults, touch has been proven to lower blood pressure, reduce tension, restore a normal heartbeat, and lift depression and anxiety.

Choose wisely if you decide to go to a professional for a massage. Often, they are quite expensive and may be an unnecessary luxury. You may not need to go to such an extent to benefit from healthy touch. On the other hand, if you find a good massage therapist, it may be one of the most relaxing things you can do.

## Sleep

Lack of sleep or poor sleep may cost you your good long-term health. Links have been found between too little sleep and obesity, diabetes, heart disease, hypertension, immune functioning or susceptibility to infections, and lower life expectancy. Even one night of inadequate sleep for those with hypertension can cause elevated blood pressure the next day. Poor sleep can have a detrimental effect on exam success and creativity and can impair your memory. Not getting enough sleep can cause you to gain weight and will detract from your normal health and wellness.

For these and additional reasons, lack of sleep is considered one of the top four risk factors leading to chronic disease. Lack of sleep is associated with lowering leptin and raising ghrelin, hormones that control appetite. Poor sleep can also result in food cravings for sweets. It also increases the production of the stress hormone cortisol. Hormone production is disrupted when we get fewer than seven hours of sleep a night. For most individuals, a good seven or eight hours of sleep is basic to daily and lasting health.

Developing healthy sleep patterns is a crucial aspect of living a healthy life. This is challenging when you live in a dorm or other student housing and people are going to bed at all hours of the night. Even though it can be a challenge, adequate sleep is as important to your overall health as eating and exercising wisely (*Figure 22*).



**Figure 22.** Sleep is very important to overall health.

## Meditation and Meditative Exercise

There are many forms of **meditation** that can be helpful. This is another means of quieting the sympathetic nervous system and awakening the parasympathetic division. Studies have shown that some forms of meditation can reduce distress, while other studies show little improvement—basically, the research results are inconclusive. If meditation appeals to you and you've found it to relieve your distress, it's certainly something to consider. Again, use wisdom and keep a balance with the rest of your life.

## Prayer

To some, this might be a form of meditation. Maybe you learned to pray as a child. As you got older, you may have just stopped praying for no good reason, or maybe it was a conscious choice. You might want to reconsider why you stopped praying and consider starting again. If you have never prayed, it is not too late to start. If you do have a belief in a loving God, it certainly makes sense to establish communication. Having faith can go a long way toward easing distress. You may very well tap into a power beyond your own.

## Yoga

Yoga can be meditative in nature and is becoming more popular on college campuses. Many universities offer courses in yoga, of which there are many variations. Fitness centers tend toward power yoga that incorporates more exertion and less relaxation. Some people find this to be their favorite physical activity. It can promote balance, calmness, flexibility, and strength (**Figure 23**).



**Figure 23.** Yoga is good for relaxation and stretching.

## Chi Gong

Chi Gong is a form of standing meditation that works the meridians used in acupuncture. It can be very relaxing and, practiced over time, a person can learn to experience life energy or chi in a tangible manner. The theory is that if you can direct your life energy or chi, you can eliminate blocks to the energy flow that disrupt healing. Balance and feelings of peace and calmness are highly valued in this manner of being physically active.

## More Than Stress Management Techniques

Many of these approaches are techniques to help us find a balance and to move us out of a state of continual low-level anxiety. But we will find that truly incorporating these practices into our lives is eventually far more than some technique—it becomes a way of life.

We can choose a way of life that values each self, beginning with our own. We can choose to learn and progress at a reasonable pace, not driven by someone else's expectations. We can choose to live within our means, pushing back the pressures to keep up or compare ourselves to another's level of prosperity. We can value relaxation as well as exercise without having to resort to extreme measures to do so. We can choose positive healthy lifestyle habits. We can choose a profession about which we can be passionate, and make a difference using our talents to benefit others. We can choose to serve in our families and our communities, all the time choosing healthy relationships. We can choose joy!

## MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Recognize the eustress you choose to have in your life.
2. Identify the main sources of negative stress in your life.
3. Select specific activities you will incorporate into your life to help offset the negative effects of stress.
4. What thoughts or feelings will help you offset the negative effects of stress? Make a plan to focus on these thoughts and feelings.
5. Do what you can to reduce negative stress in your environment and help others to embrace the concept of eustress.

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# GLOSSARY TERMS

**Allostasis:** A concept similar to homeostasis that connotes stability through variability rather than stability through sameness.

**Allostatic load:** A point at which the stress response itself becomes destructive and damages a person's health.

**Autonomic nervous system (ANS):** Part of the nervous system that works automatically, without conscious control, innervating the viscera.

**Biofeedback:** A process that enables an individual to learn how to change physiological activity for the purpose of improving health and performance.

**Corticotropin (ACTH):** A hormone produced by the pituitary gland that causes the release of glucocorticoids from the adrenal gland.

**Corticotropin-releasing hormone (CRH):** A hormone secreted by the hypothalamus in response to a stressor that stimulates the release of corticotropin (ACTH).

**Cortisol:** A glucocorticoid hormone that provides immediate energy to cope with stress and helps maintain homeostasis.

**Distress:** "Bad" stress that has negative effects on the whole person.

**Endorphins:** Morphine-simulating brain secretions that help to inhibit pain sensations.

**Epinephrine:** Known as the fight-or-flight hormone or neurotransmitter; produced by the adrenal glands.

**Eustress:** "Good" healthy stress; a positive challenge that is often fulfilling.

**Fight-or-flight response:** The response of the sympathetic division to prepare the person to defend against a threat.

**General Adaptation Syndrome (GAS):** A nonspecific syndrome in response to stressful conditions.

**Glucocorticoids:** Steroid hormones involved in glucose metabolism and manufactured in the adrenal glands.

**Homeostasis:** The balance of bodily processes such as heart rate, blood pressure, and hormone levels.

**Immune system:** A system of cells, tissues, and organs that provide defense against invading organisms.

**Meditation:** Focusing the mind to initiate relaxation; often accompanied by deep breathing and done in a quiet environment.

**Norepinephrine:** A hormone and neurotransmitter closely associated with epinephrine released throughout the body by the sympathetic nervous system.

**Parasympathetic division:** A division of the ANS that slows metabolism and restores energy.

**Stress:** The mindbody response when homeostasis or allostasis is threatened.

**Stressor:** That which upsets homeostasis or allostasis and causes stress.

**Sympathetic division:** A division of the ANS that accelerates body processes to respond to threats.

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Reduce Risk for Chronic Disease

# Why Does Lifestyle Matter?

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We live in an interesting time in history regarding health and wellness, because most of the medical problems we face are due to lifestyle. Many diseases of the past such as tuberculosis, polio, smallpox, and fatal infections have little or no lasting impact on populations today—medical advances have curbed or even eradicated these diseases. Many of the health problems we face now, we bring on ourselves. That is why chronic diseases are also termed lifestyle diseases.



## After reading this chapter, you will be able to:

- › **DEFINE** chronic disease and explain how it impacts society.
- › **IDENTIFY** factors that increase your risk for chronic disease.
- › **DESCRIBE** the chronic diseases that are the leading causes of death in the United States.
- › **EXPLAIN** why lifestyle can reduce the risk to chronic disease and reflect on how your lifestyle increases or reduces your risk to specific chronic diseases.



**Figure 1.** Chronic diseases like diabetes develop gradually over time and then persist throughout one's lifetime.

# Why Does Lifestyle Matter?

reduce risk for chronic disease

## CHRONIC DISEASE AND ITS COSTS

The terms acute and chronic refer, in general, to the rate or timing in which a disease progresses. An **acute disease** is one that has a specific cause, manifests itself quickly, and is often cured rather quickly. A **chronic disease** develops over time and lasts for a long duration (*Figure 1*). In many cases, there are no cures for chronic illnesses unless lifestyle changes are made.

### An International Problem

Worldwide, chronic disease is responsible for 80 percent of all deaths (more than 30 million) with 85 percent of those deaths occurring in developing countries. Equally as many women as men die from chronic diseases in the world.

The World Health Organization (WHO) declares unhealthy diet, physical inactivity, and tobacco use as three main risk factors for chronic disease. At least 80 percent of heart disease, stroke, and type 2 diabetes deaths, and 30–50 percent of cancer deaths, would be prevented if people did not smoke, ate healthier diets, and were more physically active. If there are no preventative actions, 17 million people will die prematurely (before the average lifespan by country) from chronic disease.

At present, nearly 2 billion adults are overweight and more than 38 million children under the age of 5 are overweight. Tobacco use is the leading cause of preventable death worldwide and causes at least 7 million deaths each year. These statistics do not represent all the people in the world suffering from a poor quality of life due to chronic diseases.

# Is Obesity a Chronic Disease?

The World Health Organization and the National Institutes of Health (NIH), the nation's research agency of the U.S. Department of Health and Human Services (HHS), have defined obesity as a chronic disease. Designating obesity as a disease continues to be a hot political issue, one not unlike the decision in 1996 by the American Medical Association (AMA) to define alcoholism as a disease.

In 2002, the IRS began allowing tax deductions for weight loss programs. In 2004, Medicare dropped the language that obesity was not an illness but did not go so far as to define it as a disease. Then in 2013 the American Medical Association officially recognized obesity as a disease. Advocates for obesity being declared a disease believe this will help lessen the social stigma against obesity and provide greater medical support, treatment, and care for those suffering from obesity. Opponents believe that more effort should be put into prevention and are concerned that associated increased health care costs will further cripple the economy. What argument would you make for or against obesity being recognized as a chronic disease?

## U.S. Statistics

The Centers for Disease Control (CDC) defines chronic diseases such as heart disease, cancer, stroke, diabetes, and arthritis as "non-communicable illnesses that are prolonged in duration, do not resolve spontaneously, and are rarely cured completely" ([www.cdc.gov](http://www.cdc.gov)).

Approximately 60 percent of American adults live with at least one chronic illness and 4 in 10 have two or more chronic diseases. Of those, half experience significant limitations in daily activities. Chronic diseases cause 70 percent of deaths each year in the United States. Approximately 40 percent of children and adolescents have chronic health conditions in the United States. Chronic diseases are the most common and costly of health problems in the United States, and they are also the most preventable.

## Most Chronic Disease Is Preventable

The CDC has stated that more than 75 percent of healthcare costs are due to chronic conditions that could be prevented if the following risk factors were eliminated:

- Tobacco use
- Insufficient physical activity
- Poor eating habits
- Excessive alcohol use

These four modifiable behaviors are responsible for much of the illness, disability, and premature death in our world today (*Figure 2*).



**Figure 2.** Many chronic diseases can be prevented with behavioral changes.

## National Statistics

According to the CDC, 4 in 10 adults in the United States have two or more chronic diseases. Heart disease and cancer are the leading killers. Nearly 42% of all adults are obese, and 1 in 5 children between the ages of 2–19 are obese. When you look at the national behavioral survey results, it is clear that behaviors, such as diet, physical inactivity, and smoking, explain why so many people suffer from chronic disease.

- Approximately 12.5 percent of adults—30.8 million—are current smokers. Smoking is highest among people aged 25–44 years and 45–64 years, with the lowest rates among those aged 18–24 years. . Tobacco use killed 500,000 Americans in 2020.
- In 2018, only 53.3 percent of adults met recommended guidelines for aerobic physical activity, which is at least 150 minutes a week of moderate-intensity physical activity or 75 minutes per week of vigorous-intensity aerobic activity. Only 23 percent of adult Americans met recommended guidelines for both aerobic and muscle-strengthening activities..
- Only 12.3 percent and 10 percent of U.S. adults meet daily fruit and vegetable intake recommendations, respectively.
- About 1 in 6 adults 18 and older engaged in binge drinking in the past 30 days and nearly 45 percent of high school students report having had at least one drink of alcohol in the past 30 days.

## Mental Illness and Chronic Disease

There is an old adage that states, “There is no health without mental health.” There is an entire chapter in this text that discusses and presents information on mental illness. However, it is appropriate to include in this chapter the relationship between mental and physical chronic disease conditions.

## Evidence That Links Chronic Disease and Mental Illness

In an editorial for the CDC titled “Integrating Care for Medical and Mental Illnesses,” Sederer cites his own research and articles by Kessler and McVeigh that provide evidence of the strong link between mental disorders and medical illnesses. A few selected examples of this relationship include:

- Individuals with depressive disorders are about twice as likely to develop coronary artery disease, twice as likely to have a stroke, more than four times as likely to have a myocardial infarction (MI or heart attack), and four times as likely to die within 6 months of an MI as people without depressive disorders.
- People with diabetes are twice as likely to have depression as the general population.
- Health care expenditures are more than 4 times greater for people with diabetes and depression than people without them.
- About 50 percent of people with asthma have symptoms of depression and anxiety.
- Individuals with cancer commonly have mental disorders.
- Chronic pain, Alzheimer’s disease, Parkinson’s disease, epilepsy, and obesity are other conditions in which mental and physical disorders routinely coexist and in which the presence of a mental disorder impairs functioning and effective disease management.

Dr. Richard Kadison, M.D., the former head of mental health services at Harvard University Medical Center, is working to raise awareness of the extraordinary increase in mental illnesses on college campuses today. Dr. Kadison reports that since 1988, college students are twice as likely to develop serious depression, 3 times as likely to consider suicide, twice as likely to engage in binge drinking, and 4 times as likely to be the victim of sexual assault.

Recognizing the reality of the whole being, the relationship between chronic illness and mental illness makes sense (*Figure 3*). Medical doctors are becoming increasingly aware of this connection. Those working with mental illness are trying to facilitate the diagnosis of mental problems by medical doctors and other medical personnel. The less we segregate the dimensions of our being, the more effectively we can work on prevention and care of chronic physical and mental health problems.



**Figure 3.** There is evidence of a strong link between chronic disease and mental illness, such as depression.

# Costs of Chronic Diseases

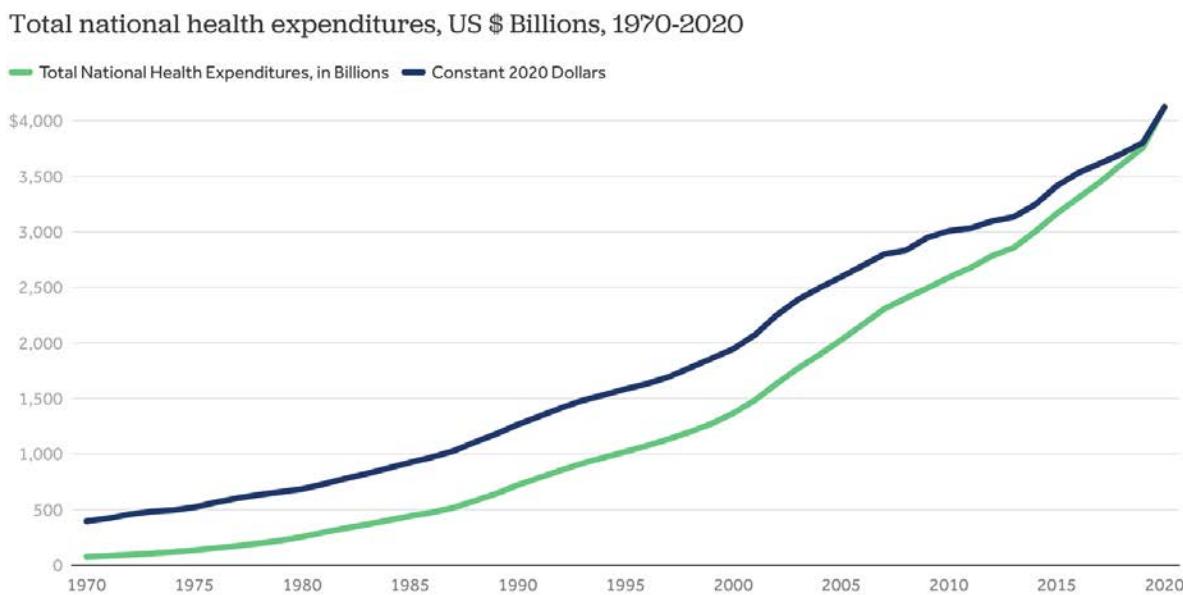
CDC statistics state that 90 percent of the \$4.1 trillion in annual medical care costs are people with chronic physical and mental health conditions. In 2018 a combined \$363 billion was spent on healthcare costs and lost job productivity for heart disease and stroke. Costs associated with tobacco use are over \$300 billion every year with \$5.6 billion in lost productivity due to secondhand smoke exposure. The estimated total costs of obesity are about \$270 billion a year. The indirect and direct costs associated with diabetes are estimated at \$327 billion annually. The annual costs associated with cancer are an estimated \$89 billion. Arthritis-related costs are approximately \$128 billion annually. Of the 3.3 million people who die each year in the U.S., approximately 70 percent die from a chronic disease. The leading causes of death in the United States are shown in *Table 1*.

**Table 1. Leading Causes of Death in the United States (2020)**

Cause of Death	Deaths per Year
Diseases of the heart	696,962
Cancer	602,350
COVID-19	350,831
Unintentional injuries	200,955
Stroke	160,264
Chronic Lower Respiratory Disease	152,657
Alzheimer's disease	134,242
Diabetes	102,188
Influenza and pneumonia	53,544
Nephritis	52,547

*Source:* Centers for Disease Control

The cost of healthcare in the United States has escalated since 1960 (*Figure 4*). Healthcare costs totaled \$74.1 billion in 1970 and by 2000 the costs were about \$1.4 trillion. In 2020 healthcare spending reached \$4.1 trillion and has increased at a faster rate in the past few years than in previous years.



Note: A constant dollar is an inflation adjusted value used to compare dollar values from one period to another.

**Figure 4.** The cost of health care increased significantly in the last 50 years. Health care costs for individuals and our society can be greatly reduced if we will adopt lifestyle changes that keep us healthier. *Source:* Kaiser Family Foundation.

## Ways to Reduce Costs

The CDC uses a state-based system of health surveys called the Behavioral Risk Factor Surveillance System (BRFSS) to gather data. The information is used to try to improve people's health and reduce health care costs. The CDC identifies the following prevention programs as the most cost-effective to date:

- Every \$1 spent on water fluoridation saves \$38 in dental treatment costs.
- Smoking cessation programs would cost an estimated \$2,587 per life saved, the most cost-effective of all clinical preventive services.
- Every \$1 spent on the Safer Choice Programs (HIV, STD, and pregnancy prevention) saves about \$2.65 on medical and social costs.
- Every \$1 spent on preconception care programs for women with diabetes can reduce health costs by up to \$5.19 by preventing complications for mothers and babies.
- An Arthritis Self-Help Course for 10,000 people will yield savings of more than \$2.5 million and reduce pain by 18 percent among participants.
- A mammogram every 2 years for women ages 50–69 saves about \$9,000 per year of life, which compares favorably with other preventive services.

## RISK FACTORS FOR CHRONIC DISEASE

Risk factors are those behaviors that lead to chronic disease. They are called risk factors because they lead to illness or death that is otherwise preventable if a person does not engage in the risky behavior. The leading preventable cause of death and disease in the United States is tobacco use. Physical inactivity is a close second and may soon overtake smoking as the leading preventable cause of death and disease as rates for tobacco use trend downward. The Department of Health and Human Services published *The Burden of Chronic Disease*. Here are some of the data from that publication for several common risk factors.

### Tobacco Use

The risks for lung cancer, other cancers, cardiovascular disease, chronic lung disease, and adverse reproductive outcomes are associated with tobacco use (*Figure 5*). When people of any age quit smoking, they enjoy health benefits immediately. After quitting, they will have fewer problems with disability and are more apt to live longer than if they don't quit.



**Figure 5.** Tobacco use causes 1 out of every 5 deaths in the United States, and 10 percent of these deaths are from exposure to secondhand smoke.

## Lifestyle Studies

The data obtained from longitudinal lifestyle studies demonstrate the efficacy of choosing to live a healthy lifestyle. If you are living a healthy lifestyle with the goal of enjoying better health, a better quality of life, and to avoid premature death, know that it works (*Figure 6*)!

The *Journal of the American Medical Association (JAMA)* published reports in July 2009 on two major studies dealing with lifestyle and chronic illness: the second Nurses' Health Study had 83,882 female subjects, and the first Physicians' Health Study had 20,900 male participants. The focus of the study on physicians, which took place over 22 years (1982–2008), was on the relationship between heart failure and six lifestyle behaviors: alcohol intake, body weight, consumption of cereals, consumption of fruits and vegetables, exercise, and smoking.

Of all these factors, obesity stood out—according to the author of this study, Dr. Luc Djousse, the risk of heart failure was 17 percent in those who were overweight or obese and 11 percent in those with normal weight. Exercise was also a significant factor with heart failure in 14 percent of those not exercising and 11 percent in those who did exercise.

The nurses' study was conducted over 14 years (1991–2005) and focused on high blood pressure and stroke in relation to six lifestyle factors: alcohol intake, body weight, DASH diet to prevent high blood pressure, exercise, use of non-narcotic painkillers, and use of a folic acid supplement. Only 3 percent of the women followed all six lifestyle factors, but those women did have 80 percent lower incidence of high blood pressure than those who followed none of the factors. Consistent with the study on the male physicians, obesity among the nurses was the greatest contributing factor to their heart problems.



**Figure 6.** Managing a healthy lifestyle will reduce your risk of heart problems.

Here are a few sobering facts about the effects of tobacco use:

- Tobacco use is responsible for more than 480,000 deaths annually, or 1 in 5 deaths, and about 10 percent of the 480,000 deaths were a result of secondhand smoke.
- The total economic costs of tobacco use exceed \$300 billion annually in the U.S. This includes more than \$225 billion in medical expenses and more than \$156 billion in lost productivity.
- About 16 million Americans have at least one illness due to smoking.
- Worldwide, tobacco use kills more than 7 million people annually.
- Every day about 2,000 youths aged 18 and younger try a cigarette for the first time.

## Physical Inactivity

In the CDC's BRFSS survey, adults were asked if they took part in physical activity in addition to their regular job duties. This physical activity was termed leisure-time physical activity. One out of four adults reported doing no leisure time activity. According to the CDC, the minimum amount of activity recommended for adults is 150 minutes of moderate-intensity accumulated activity per week, which could be something like a 30-minute brisk walk 5 days a week. Another option recommended by the CDC is to accumulate 75 minutes of vigorous-intensity activity such as jogging or running. You can also meet the recommendation with an equivalent mix of moderate-intensity and vigorous-intensity activity.

In addition to the aerobic activity recommendations the CDC recommends muscle-strengthening activities on 2 or more days per week that work all the major groups (legs, arms, shoulders, chest, back, abdomen, and hips). The CDC maintains that people of all ages can benefit from some activity. Some health benefits can be had just by sitting less and moving more. Any amount of moderate-to-vigorous intensity physical activity is better than none!

The benefits of regular physical activity include: reduction in a person's risk for heart attack, colon cancer, diabetes, and high blood pressure, and possible reduction in their risk for stroke. Physical activity also helps to control weight; contributes to healthy bones, muscles, and joints; and reduces falls among the elderly. Physical activity helps to relieve the pain of arthritis, reduces symptoms of anxiety and depression, and can reduce the need for hospitalizations, physician visits, and many medications. The CDC also reported that 48 percent of high school students were not enrolled in a physical education class.

It took a long while to get the lack of physical activity to be identified as a risk factor for chronic disease. Years of research evidence finally convinced policy-makers to include this factor in the BRFSS survey and in the listing of risk factors. Hopefully, with increased awareness and more support from policy-makers, we can get more and improved programs of physical education back in the schools and the lives of everyday people. Having the instruction to learn lifetime sports and recreational activities and the opportunity to value and practice leisure-time physical activities will hopefully contribute to people wanting to be physically active throughout their lifetime (*Figure 7*).



**Figure 7.** You can be physically active without going to the gym or jogging 5 miles. Leisure-time activities are easily incorporated into your daily life, such as walking, gardening, and other enjoyable and often social activities.

## Poor Nutrition

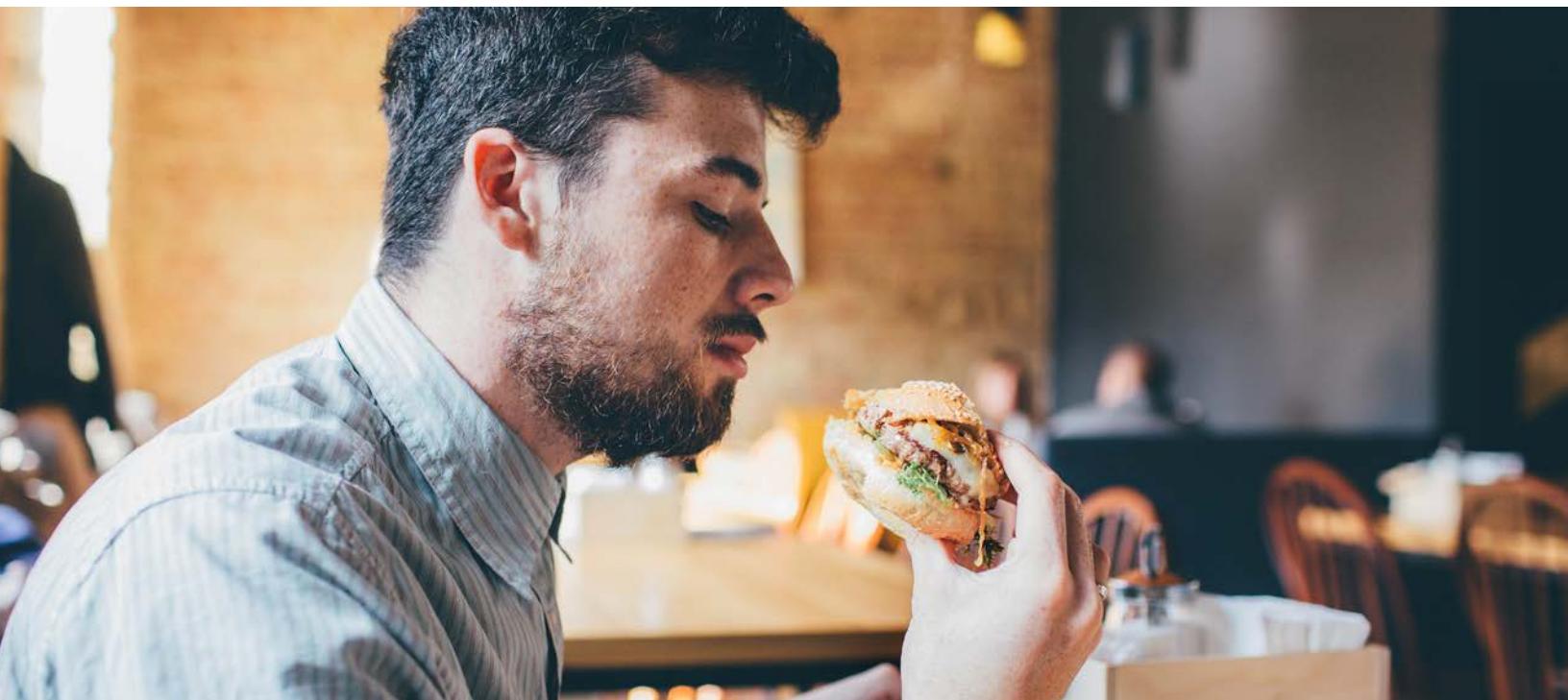
Poor eating habits contribute to many different illnesses. The CDC and other experts recognize that an improved diet would reduce the risk for heart disease, stroke, some cancers, diabetes, and osteoporosis. Here are some facts related to nutrition in the United States:

- Poor nutrition is considered the number one cause of illness in the U.S. and is responsible for more than 500,000 deaths annually.
- More than 75 percent of adults reported not eating five or more servings of fruits and vegetables each day.
- 79 percent of high school students ate fewer than five servings of fruits and vegetables each day.
- Recent evidence has shown that diet-related illnesses have worsened COVID-19 outcomes.

## Obesity

The CDC reports that obesity has reached epidemic proportions in the United States, more than doubling in the past two decades (*Figure 8*). Overweight is defined as a body mass index (BMI) of 25–29.9, and obesity is defined as a BMI of 30 and above. Obesity contributes to many health problems. The CDC says that people who are overweight or obese are at increased risk for heart disease, high blood pressure, diabetes, arthritis-related disabilities, and some cancers; it has also been shown that they are less responsive to flu and COVID-19 vaccines. Here are a few details from the CDC and the National Institutes of Health (NIH) on obesity in the United States:

- The medical costs of obesity were estimated to be nearly \$173 billion in 2019.
- More than 80 percent of adults are overweight or obese.
- More men than women are overweight or obese.
- More than 40 percent of youth ages 2 to 19 years are overweight or obese.



*Figure 8. Chronic health problems can be caused by both poor nutrition and obesity.*

## Lack of Sleep

Lack of sleep is emerging as a major risk factor for chronic disease. Sleep problems may be the number one physical challenge for college students. Dr. Neil B. Kavey, M.D., director of a sleep disorder clinic in New York City, reported that 69 million people—35 percent of the adult population—have insomnia.

Roseanne Armitage, director of the sleep laboratory at the University of Michigan, said, “our ability to fall asleep and to progress through the slow-wave and REM cycles is strongly influenced by our biological clock that is set by circadian factors.” Melatonin is a hormone that helps to regulate normal sleep cycles. Staying up after midnight in lighted areas or in front of computer screens slows down the production of melatonin, causing circadian rhythm disorders.

Sleep deprivation can result in cravings for sugary foods, thus leading to weight gain, can result in depression, anxiety, reduced cognitive functioning, and impaired memory. Many physical and mental chronic illnesses can be linked to sleep problems. Approximately 80 percent of people with depression have sleep problems.

Dr. John W. Winkelman, M.D., Ph.D., Harvard University professor and director of a sleep lab in Boston, maintains that sleep problems (*Figure 9*) cause depression and anxiety disorders, and may be a trigger for bipolar disorder. Lack of sleep adversely affects the immune system and thus can be related to many physical illnesses as well. A study of 578 adults ages 33–45 concluded that those who slept only 6 hours a night had significantly higher blood pressure than those getting 7–8 hours a night.



**Figure 9.** If you are routinely sleep deprived, you are setting yourself up for several physical and mental chronic health problems.

## High Blood Pressure

In 2017, the American College of Cardiology and the American Heart Association published new blood pressure guidelines. With these new guidelines the prevalence of hypertension changed dramatically. High blood pressure is another modifiable risk factor. The CDC reports that lowering blood pressure can help people reduce the risk for heart disease, stroke, and other coronary events. More will be said about hypertension later as a specific kind of cardiovascular disease.

Here are statistics from the CDC about the prevalence of blood pressure in the United States:

- A 12–13 point reduction in blood pressure among people with high blood pressure can reduce heart attacks by 21 percent, strokes by 37 percent, and total cardiovascular disease deaths by 25 percent.
- Nearly half of adults in the U.S. (116 million people) have high blood pressure.
- Only 24 percent of adults with high blood pressure do not have it under control.

# High Blood Cholesterol

This is another factor within individual control, either through diet or medication or both. It is recommended that each adult get his or her cholesterol checked every 5 years. High blood cholesterol is a risk factor for heart disease and stroke. Total cholesterol should be under 200 mg/dl. The CDC estimates that 38 percent of American adults have a total cholesterol higher than 200 mg/dl. Of those people with high cholesterol, 80 percent are not managing it. The CDC figures that a “10 percent decrease in total cholesterol may reduce the incidence of coronary heart disease by an estimated 30 percent.”

## Other Risk Factors

There are many other risk factors such as routine screening, stress, family history, environment, access to health care, and so on that can impact risk for chronic illness. Some of these, such as stress, will be covered in another chapter in this course.

Routine screening is one thing a person can do to significantly reduce their risk for chronic disease. Even though it can be hard to make the time or spend the money for something when everything seems good, regular screenings can catch a disease at its earliest stages and make treatment and even prevention more viable. Not having diagnostic screening exams such as a mammography, colonoscopy, or fecal occult blood test places a person at risk.

It is recommended that women over 40 consult with a doctor to determine familial risk for breast cancer and decide when to get a mammogram. Typically, women at average risk and who are 50 to 74 years old get a mammogram every two years. The current guidelines for colonoscopy are to get the first one at age 45. Previously the recommendation was age 50 for first colonoscopy, but recent studies have shown increased rates of colon cancer in people younger than age 50. Men should get a prostate specific antigen (PSA) test between ages 45–49 to get a baseline measure then work with their doctor for future assessments. Blood pressure, cholesterol, glucose/insulin sensitivity, A1c, and other tests can also help catch disease processes early and make treatment and prevention efforts more successful.

## TYPES OF CHRONIC DISEASES

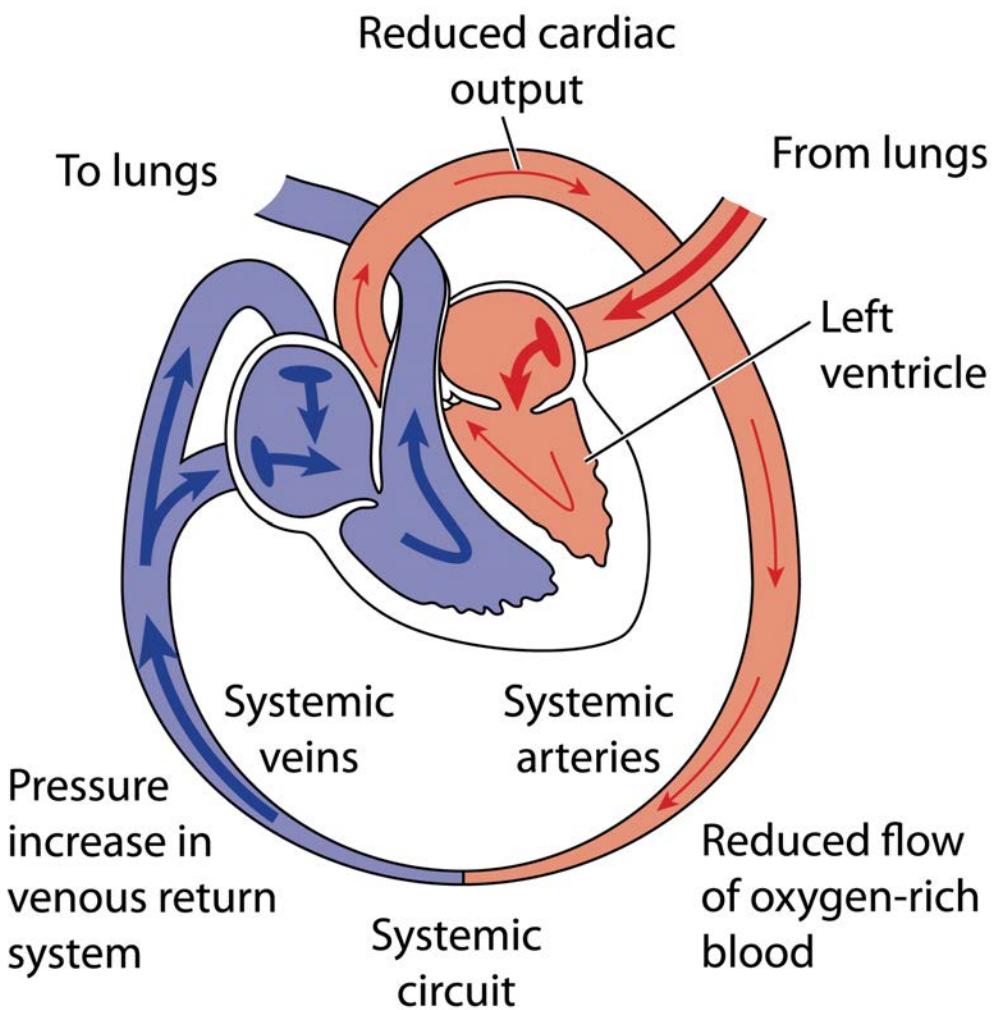
Now let's consider several specific chronic diseases to understand the nature of the conditions. A study of this type may help our commitment to living a healthy lifestyle, so we can avoid these diseases. Life is a whole lot more enjoyable when a person is as healthy as possible. Life is better when we make wise choices and avoid the risk factors that contribute to these illnesses. Beginning early is a key to prevention even though it would not be unusual for you to know someone your age who is already dealing with a chronic disease.

## Heart Diseases

Heart diseases involve both the heart (cardio) and blood vessels (vascular) and are referred to collectively as ***cardiovascular disease (CVD)***. Because of the number of possible types of cardiovascular disease, we will address only the most prevalent forms of chronic CVD. Heart disease continues to be the number one cause of death for both men and women.

## Heart Failure

The failing heart works inefficiently and does not pump out all the blood that returns to it. This means the heart is not pumping enough blood and oxygen to the organs of the body (*Figure 10*). The heart tries to accommodate through pathological enlargement and by beating faster. Blood pressure also increases to try to compensate for the weak pumping of the heart.



*Figure 10.* A heart that is in failure is not able to pump enough oxygen-rich blood to the body's tissues.

**Congestive heart failure** is a form of heart failure characterized by excess fluid buildup in the lungs and other parts of the body. It is caused by blood flow in the veins getting backed up, causing congestion in the tissues. The inefficiency of the pumping action of the heart also adversely affects the kidneys so they do not effectively eliminate sodium and water. Fluids accumulate in the body causing swelling (edema), most often seen in the ankles and lower legs.

The major causes of **heart failure** are coronary artery disease, having had a heart attack, and high blood pressure (**hypertension**). Physical inactivity, being overweight, smoking cigarettes, having diabetes, abusing alcohol, or using cocaine all increase the risk of developing heart failure.

## Coronary Heart Disease (CHD)

The atherosclerotic narrowing of the coronary arteries, those around the heart, causes coronary heart disease. **Coronary heart disease (CHD)** results when any coronary artery is narrowed by at least 60 percent, reducing the flow of blood to the heart muscle (*Figure 11*).



**Figure 11.** Coronary heart disease is caused by the narrowing of the cardiac arteries that supply the heart muscle.

A **coronary occlusion** is an obstruction of blood flow often caused by a coronary thrombus (blood clot) that forms in the artery, causing coronary thrombosis or heart attack. Part of the heart muscle, the myocardium, is damaged or dies because of lack of blood flow to the area. The medical term for a heart attack is myocardial infarction (MI).

**Myocardial ischemia** is a condition in which the heart muscle is getting insufficient blood and, therefore, insufficient oxygen to function properly.

**Arteriosclerosis** is more commonly known as hardening of the arteries in which the arteries become thickened and lose elasticity. Arteriosclerosis occurs more rapidly with chronic hypertension (high blood pressure) and is associated with aging. **Atherosclerosis** is a form of arteriosclerosis that occurs because of deposits of fat, cholesterol, or other substances on the lining of the arteries, making the inner lining of arteries irregular and thick. Built up this can become plaque which restricts blood flow. Plaque can also rupture causing blood clots or thrombosis.

A blood clot or particle, termed an embolus, moving through the bloodstream may create an **embolism** by lodging in a narrowed vessel and blocking circulation. When an embolism occurs in the brain (a cerebral embolism) it can cause a stroke. **Coronary artery disease (CAD)** is atherosclerosis that can result in a heart attack or heart failure.

**Angina pectoris**, often called just angina, is severe sudden chest pain when a person is at rest (**Figure 12**). It is a common sign of lack of adequate blood flow from the coronary arteries.

Major risk factors for coronary heart disease are physical inactivity, overweight/obesity, high blood pressure, high cholesterol, smoking, and poor nutrition.



**Figure 12.** Angina pectoris, often called just angina, is severe sudden chest pain when a person is at rest. It is a common sign of lack of adequate blood flow from the coronary arteries.

## Stroke

A **stroke** occurs when blood does not reach the brain. When this is caused by a blood clot blocking a blood vessel it is called an **ischemic stroke**. When it is caused by a blood vessel leaking blood into the brain due to a cerebral aneurysm or trauma, it is called a **hemorrhagic stroke**. An **aneurysm** is a weakened and distended area of the wall of an artery or a vein. An aneurysm can be present at birth (congenital) or caused by illness or trauma. Strokes can damage a person's brain, resulting in problems with speaking and possible paralysis.

Blood clots are responsible for most strokes. What takes place is very similar to a heart attack and is sometimes referred to as a brain attack. The brain tissue that does not receive its normal supply of blood and nutrients is damaged or dies. If the stroke is mild, a person may make a full recovery. If the stroke is more severe, the damaged tissue may not regenerate, and the person will suffer lasting effects.

A mini-stroke or "little stroke" is a transient ischemic attack (TIA). This means that there is just a temporary shortage of blood to the brain that does not last long. The reason it is important to know about TIAs is that they very often precede a full-blown stroke. The warning signs for mini-strokes and strokes are:

- Temporary difficulty speaking
- Dizziness or unexplained falls
- Adverse effects on vision, often in only one eye
- Sudden numbness on one side of the body (face, arm, or leg)

The risk factors for stroke are similar to those for coronary heart disease, namely physical inactivity, overweight/obesity, high blood pressure, high cholesterol, smoking, and poor nutrition.

## Hypertension

Hypertension is chronic high blood pressure. **Blood pressure** is the pressure in the arteries when the heart is contracting and the residual pressure between heart beats. The heart contraction phase that pushes blood into the aorta and pulmonary artery is called systole. Blood pressure increases during systole, resulting in **systolic blood pressure**. This is the top number of the blood pressure reading. Between beats when the heart muscle relaxes, the blood pressure decreases, producing the **diastolic blood pressure**—the bottom number of the blood pressure reading. The two numbers of a blood pressure reading are measured by a device called a sphygmomanometer, which reads the pressure in millimeters of mercury (mmHg).



**Figure 13.** The blood pressure reading your doctor measures and reports to you is a combination of two pressures: the pressure when the heart's ventricles contract (systolic pressure) and the pressure when they relax (diastolic pressure).

You should check your blood pressure regularly (*Figure 13*). Normal blood pressure is considered less than 120 mmHg for systolic pressure and less than 80 mmHg for diastolic pressure. Blood pressure is considered elevated and high based on current guidelines shown in *Table 2*.

**Table 2. Blood Pressure Categories**

Blood Pressure Category	Systolic mm Hg (Upper Number)		Diastolic mm Hg (Lower Number)
<b>Normal</b>	Less than 120	and	Less than 80
<b>Elevated</b>	120–129	and	Less than 80
<b>High Blood Pressure (Hypertension) Stage 1</b>	130–139	or	80–89
<b>High Blood Pressure (Hypertension) Stage 2</b>	140 or Higher	or	350,831
<b>Hypertensive Crisis (Consult Doctor Immediately)</b>	Higher than 180	and/or	Higher than 120

*Source:* American Heart Association

When arteries are narrowed, or clogged, blood pressure increases because the blood must squeeze through a tighter space. Hypertension may also increase atherosclerosis and the possibility of heart failure, heart attack, stroke, kidney failure, and peripheral artery disease (PAD).

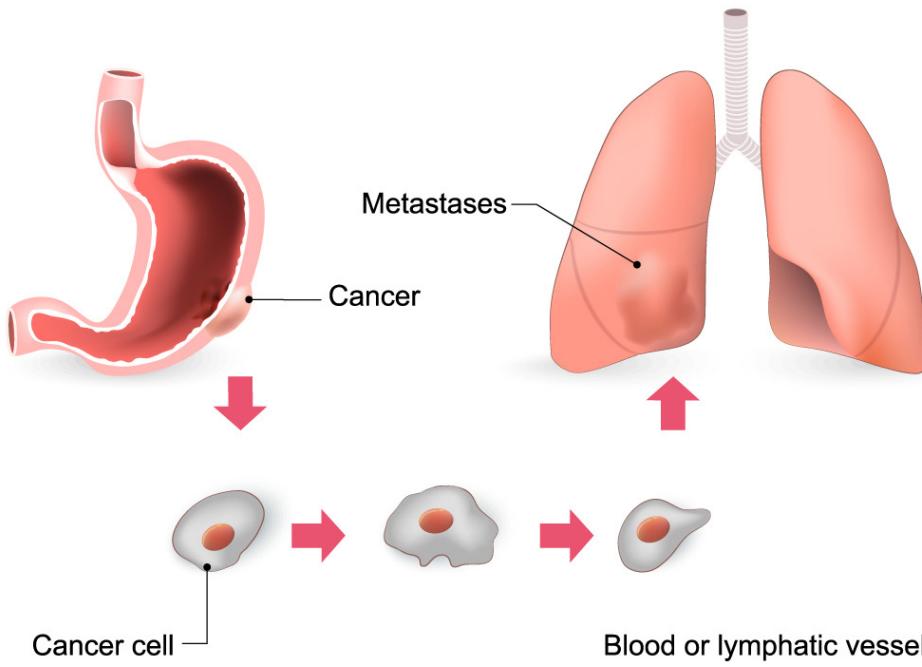
## Peripheral Artery Disease

Like coronary artery disease (CAD), **peripheral artery disease (PAD)** is also caused by atherosclerosis but affects the arteries outside the brain and heart. This condition is usually found in the arteries of the pelvis and the legs. When plaque builds up in the peripheral arteries it causes pain, sores, and difficulty walking. If the circulation is completely blocked, gangrene may result and worst of all, a limb may need to be amputated.

## Cancer

**Cancer** describes a group of diseases in which abnormal cells divide in an uncontrolled way. These abnormal cells can spread through lymph systems and blood to other parts of the body. The proliferation of these abnormal cells takes over the role of normal cells. Beyond this commonality, cancers can be quite different from one another and require treatments specific to each form.

A cancer continues to be named according to the place at which it began in the body, even if it spreads to another location in the body. If colon cancer spreads to the pancreas, it is still called colon cancer. If a cancer does spread to another area of the body, usually through the blood or lymph system, it is called **metastasis**. Metastatic cancer is cancer that has formed new tumors in a different location from which it started (*Figure 14*).



**Figure 14.** Sometimes cancer begins in one location in the body but then spreads to a completely different location via the bloodstream or lymph system. When this happens, the cancer is said to have metastasized.

The most common cancers in men are prostate, lung, and colorectal cancer and in women the most common cancers are breast, lung, and colorectal. Lung cancer is the most lethal cancer in both men and women and prostate, breast, and colorectal cancers are some of the most treatable cancers, especially when diagnosed early. The lifetime risk for developing any cancer in men is 1 in 2 and for women the risk is 1 in 3. Some of the most common forms of cancer are discussed in the following sections.

## Tumors

A tumor, as defined by the American Cancer Society, is an abnormal lump or mass of tissue that can be benign (non-cancerous) or malignant (cancerous). **Benign tumors** pose no threat to a person's health in and of themselves. They are only problematic if they are causing pain or disrupting the body in some way. **Malignant tumors** are a mass of out-of-control cells that continue to grow and invade other tissues and parts of the body.

Biopsies are tests that are performed to determine if a tumor is benign or malignant. A **biopsy** is the extraction of a sample of tissue from the area of concern, which is then analyzed for malignant cellular characteristics or lack thereof. Although tumors are common in cancer cases, not all cancers are composed of tumors, or even form tumors, such as leukemias, most lymphoma, and myeloma.

Some tumors are in locations where they can be palpated (touched), and others grow in areas where they are hidden. These hidden tumors usually create pain or disturbances in bodily functions over time that lead to their discovery. About 80 percent of malignant tumors are **carcinomas**—tumors that begin in the cells that line tissues and organs. A sarcoma—a rare cancer in humans—is a malignant tumor made of cancerous muscle, cartilage, bone, vascular tissue, or fat tissue.

## Carcinogens

**Carcinogens** are substances that either cause or foster cancerous growth. The International Agency for Research on Cancer (IARC), a part of the WHO, has developed a classification system to communicate information about known carcinogens and their influence on humans. Some forms of radiation, inhaled asbestos, and tobacco smoke are a few of the most well-known carcinogens. It is also possible for a virus, such as the human papilloma virus, to cause cancer.

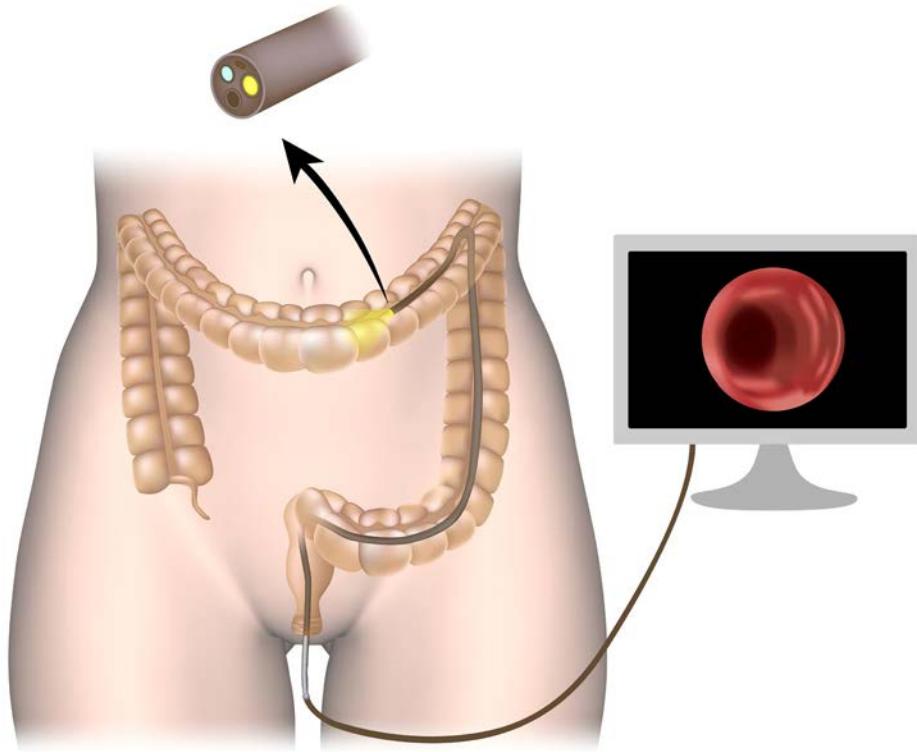
## Lung Cancer

Lung cancer is categorized as either small cell lung cancer (SCLC), non-small cell lung cancer (NSCLC), or lung carcinoid tumor. The American Cancer Society estimates for 2022 there will be about 236,740 new cases of lung cancer and there will be about 130,180 deaths from lung cancer. More people die of lung cancer than from all the colon, breast, and prostate cancers combined. According to the National Cancer Institute, lung cancer was the 2nd leading cause of cancer death for men and women in 2022.

SCLC is also called oat cell cancer, oat cell carcinoma, and small cell undifferentiated carcinoma. About 10–15 percent of all lung cancers are SCLC that spread rapidly from the bronchi in the chest to the brain, liver, adrenal glands, and bones. NSCLC accounts for about 85–90 percent of lung cancers. NSCLC has three subtypes: adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. Adenocarcinoma constitutes about 40 percent of lung cancers and is found in the outer part of the lung. Squamous cell carcinoma constitutes about 25–30 percent and is found in the middle of the lungs. The remaining 15–25 percent is large cell undifferentiated carcinoma that can be found anywhere in the lung and which tends to spread quickly.

The symptoms of lung cancer are difficulty breathing, persistent cough, hoarseness, chest pain, loss of appetite, repeated bronchial infections, and bloody spit. Nine out of 10 cases of lung cancer are due to smoking of any kind, including water pipes or hookahs. Secondhand smoke, also called environmental tobacco smoke (ETS), causes over 3,000 deaths each year in non-smokers. Those non-smokers who live with a smoker have a 20–30 percent greater chance of developing lung cancer, and those who work around smoke also have a greater chance of developing it. Smoking exacerbates environmental causes of lung cancer such as radon, radiation, asbestos, and diesel exhaust.

Lung cancer is usually treated by **chemotherapy** or **radiation**. Chemotherapy is the administration of strong drugs into the system, usually intravenously but they can be taken in pill form as well. The radiation treatment used is called ionizing radiation because it creates ions in the cells. Surgery is also common, usually in combination with chemotherapy and/or radiation.



**Figure 15.** Colonoscopy screening for colorectal cancer uses a light and a camera to look for polyps on the intestinal wall. When undetected or not removed, cancerous polyps can develop into colorectal cancer.

## Colorectal Cancer

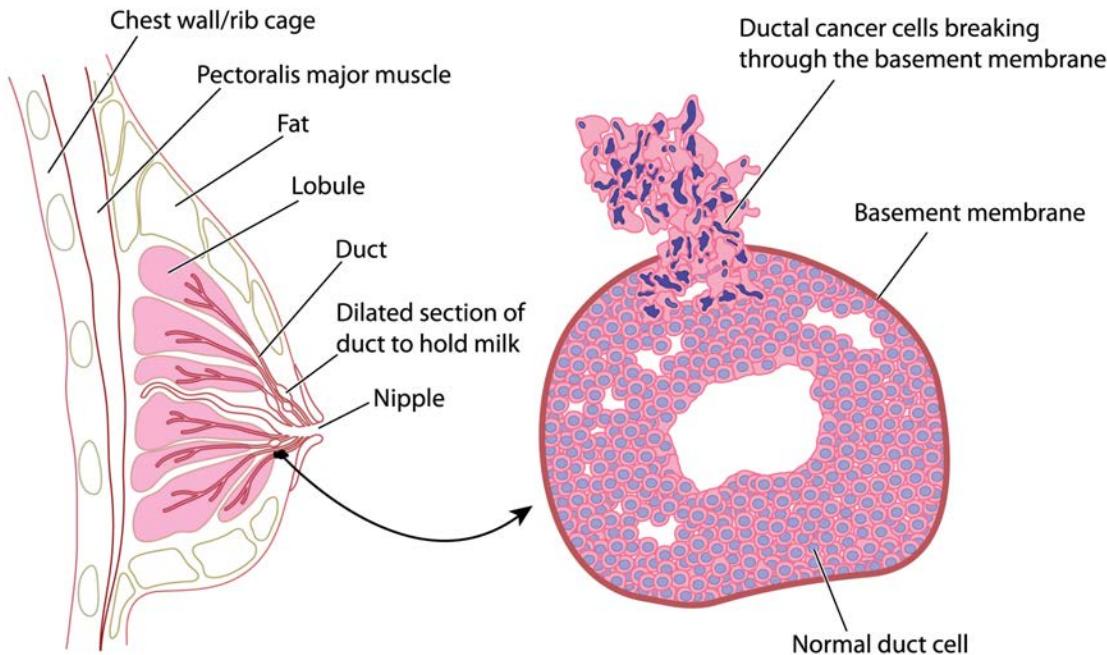
Colorectal cancer originates in the colon or the rectum and usually starts as polyps or growths in the tissue lining these structures. Colorectal cancer is the third most prevalent cancer among both men and women and the third leading cause of cancer death. According to the American Cancer Society colorectal cancer will cause about 52,580 deaths in 2022.

In the past several decades, the death rate from colorectal cancer has been declining due to frequent screening and more advanced treatments (*Figure 15*). Individuals age 45 and over are encouraged to have a colonoscopy. Depending on the results another screening may not be needed for 5 years. Both the sigmoidoscopy and the colonoscopy involve a tube going into the colon through the rectum. The virtual colonoscopy uses a CT scanner instead of a tube. Each of the tests is designed to locate polyps. Any polyps found may be removed immediately and/or biopsied. When surgery is needed following early detection, the success rate is very high.

## Breast Cancer

It is possible for men to get breast cancer, but it is far more prevalent in women. Breast cancer is the most common cancer in women, with about 287,850 new cases of invasive breast cancer and 51,400 new cases of ductal carcinoma in situ (DCIS) diagnosed in 2022. The chances of a woman developing breast cancer are about 1 in 8, but the chances of dying from breast cancer are only about 1 in 39. Earlier detection and more effective treatments account for this and for the over 3.8 million breast cancer survivors living now.

Most breast cancer cases begin in the milk ducts of the breast and then break through the walls of the duct and invade other breast tissues (*Figure 16*). Treatment often involves various forms of surgery in combination with chemotherapy and/or radiation. A lumpectomy is a surgery that removes just the tumor or “lump.” A partial mastectomy takes more breast tissue than the lumpectomy but not the entire breast. A radical mastectomy involves the removal of either one or both of the entire breasts. A modified radical mastectomy, the most common procedure if a woman is having a mastectomy, also removes some of the lymph tissue under the arm.



**Figure 16.** Breast cancer usually begins in the milk duct cells but can also spread to other breast tissues and to the lymphatic cells in the breast and armpit area.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Breast Self-Exam

A breast self-exam should be done at least once a month following the conclusion of the menstrual cycle (*Figure 17*). Look in the mirror with your shoulders back and your hands on your hips. Initially, look for any changes in the skin or in the nipple, such as redness or scaling. Look for anything unusual about the size, shape, or color of your breasts. Then raise your arms over your head and do the same inspection. Look for any watery or milky fluid coming out of the nipple.

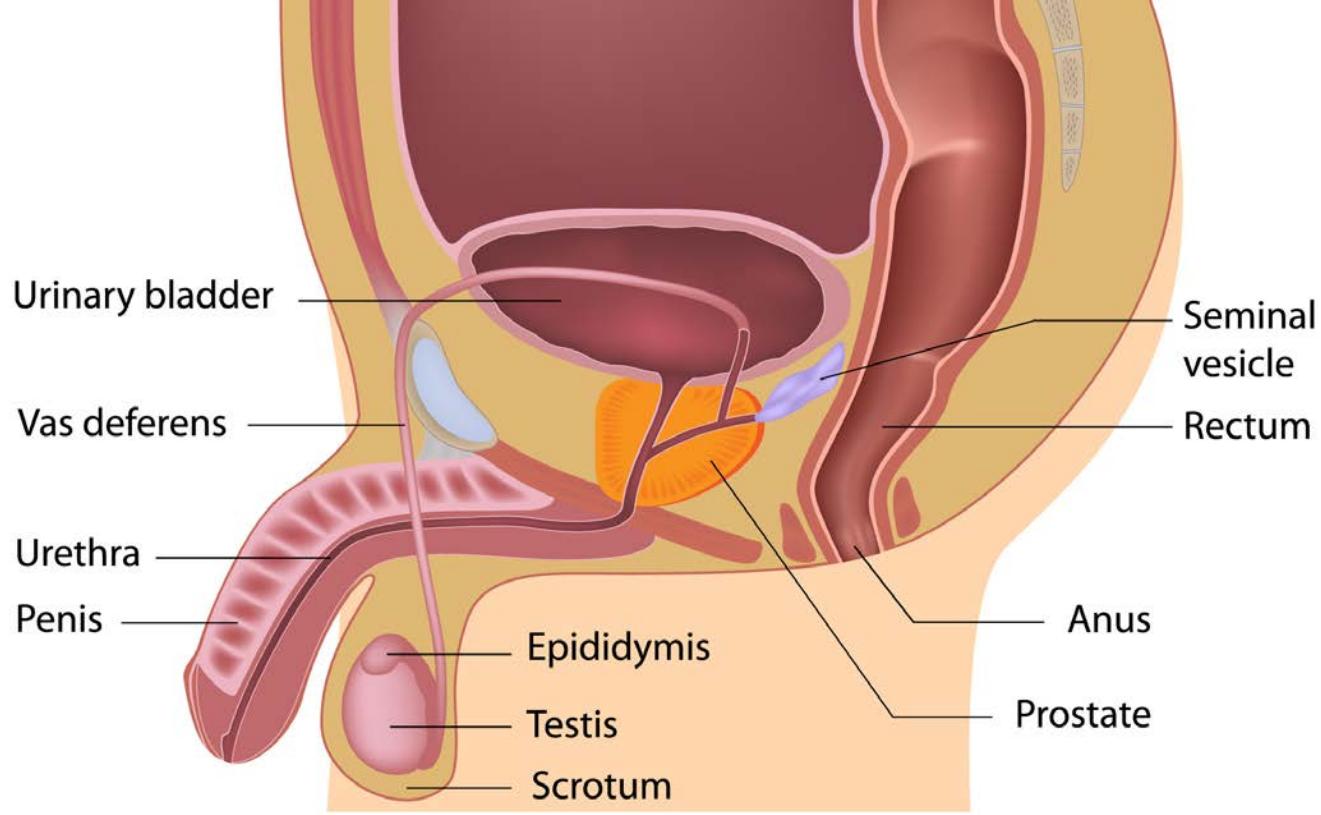
Next, physically examine each breast while lying on your back. Using your middle three fingers, lightly press down on the breast while making circular motions about the size of a quarter. Do this along a line from the underarm toward the nipple, repeating this back and forth until you cover the whole breast. You are looking for any abnormal changes in how the tissue feels. You can then repeat this same step while standing.



**Figure 17.** A monthly breast self-exam is easy, quick, and could save your life.

## Prostate Cancer

The prostate gland, only present in men, is below the bladder and in front of the rectum (*Figure 18*). The urethra tube that carries urine from the bladder goes through the prostate gland. Prostate cancer starts in the glandular cells and grows slowly. One in 8 men will get prostate cancer during their lifetime, but only 1 in 41 will die from it. Like breast cancer in women, there are over 3.1 million survivors of this cancer alive now and the numbers of deaths are steadily declining thanks to better screening and treatments. The American Cancer Society estimates for 2022 there will be about 268,490 new cases of prostate cancer in the U.S. with about 34,500 deaths from prostate cancer.



**Figure 18.** The prostate gland, present only in men, is located below the bladder and in front of the rectum. A digital prostate exam allows the doctor to palpate the prostate for bumps, hardened areas, or other signs of potential problems.

The ACS recommends that men ages 50 years and over get a prostate examination annually. If there is a family history of prostate cancer the first exam should be by age 45. A biopsy is the only sure way to detect prostate cancer. The prostate-specific antigen (PSA) blood test may or may not be a predictor of cancer, no matter how far the cancer has progressed. A healthy PSA level is 4 ng/ml (nanograms per milliliter) of blood. If the PSA is above 10 ng/ml, there is a 50 percent chance of having cancer and a 25 percent chance at levels of 4–10 nm/ml. The other test usually done in concert with the PSA is the DRE (digital rectal exam). The doctor palpates the prostate gland via the rectum in this test to determine if there are any bumps or hard places on the prostate.

The many treatment options include hormone therapy, radiation, chemotherapy, and surgery. The treatment selected is highly dependent on individual choice. The effects of each of these treatments may include impotence and/or incontinence. There is always the option to merely manage pain and not seek a cure. In many older men who have prostate cancer, the cancer is often not the cause of their death.

## Testicular Cancer

Testicular cancer is very rare but is included here because it is known as a young man's disease, particularly affecting men in their 20s and early 30s. The chance of a man having this cancer is 1 in 250, and the chance of dying from it is about 1 in 5,000. In 2022 the American Cancer Society estimates about 9,910 new cases diagnosed and about 460 deaths. Almost all testicular cancers begin in the cells that make sperm. Usual symptoms include the testicle being swollen or uncomfortable, and a general feeling of aching in the lower abdomen or scrotum.

The ACS does not recommend self-examination but does recommend a doctor include this exam as part of an annual physical. The usual treatment option is to surgically remove the testicle and the sperm duct. This does not render a man sterile, and the chances are good that he will still be able to have children.

## Skin Cancer

Skin cancer is the most common cancer and it comes in two forms—melanoma and keratinocyte carcinomas. The melanomas originate in the melanocytes, the cells that make melanin—the brown pigment in the outer layer of the skin (epidermis). The keratinocyte carcinomas are known as basal cell cancer or squamous cell cancer.

Most skin cancers (about 80 percent) are the basal cell type. The basal cells are located in the lower portion of the epidermis. It usually appears first in the head and neck, areas routinely exposed to the sun. Basal cell cancer grows slowly and rarely metastasizes. If not treated, however, it can grow more deeply into the bone and other tissues.

Melanoma is far less prevalent, about 5 percent of skin cancers, but it causes most of the skin cancer deaths. The chances of getting melanoma are about 1 in 38 for whites, 1 in 167 for Hispanics, and 1 in 1,000 for blacks. In 2022, there were about 7,650 deaths and 99,780 new cases.

Overexposure to ultraviolet (UV) radiation is the main cause of all skin cancers. The sun is the main source of UV rays. Protecting yourself from sunburn is the best way to avoid skin cancer. This is particularly true of children. Tanning booths are a dangerous source of UV radiation. Persons with numbers of dark moles are more apt to develop melanoma. If a spot on your skin gets scaly, changes color, or bleeds easily, you should get it checked by a doctor.

## Diabetes Mellitus

There are essentially two forms of ***diabetes mellitus***: type 1 and type 2. Both forms involve a disruption of insulin, which is a hormone responsible for enabling the body's cells to use glucose from food for energy. In Type 1 diabetes, the body does not produce insulin, while in type 2 diabetes the body does not use insulin properly. The CDC reports that in 2019 there were 37.3 million diabetics in the U.S., or 11.3 percent of the population.

Type 1 diabetes is less common than type 2 diabetes, and is usually diagnosed in children. In fact, it was formerly known as "juvenile diabetes." Only about 5–10 percent of those with diabetes have type 1. People with type 1 diabetes are typically insulin dependent, meaning they require regular injections of insulin. It is also very important that they carefully monitor their blood glucose levels. Type 2 diabetes used to be known as "adult onset" because it was rare in children. However, in recent years an alarming number of children are also being diagnosed with type 2 diabetes. Approximately 80 percent of people diagnosed with type 2 diabetes are classified as obese at time of diagnosis.

Type 1 diabetes is managed rather than cured. People with type 2 diabetes can eliminate their symptoms through diet, healthy weight management, and increased physical activity. Some people with type 2 diabetes may also require insulin injections, but it is usually controlled with medication and a healthy lifestyle. For people who are overweight or obese, even a modest amount of weight loss will help manage their diabetes, especially if the person loses abdominal fat.

According to the National Diabetes Information Clearinghouse (NDIC), a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK of the NIH), "African-Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Native Hawaiians or other Pacific Islanders are at particularly high risk for type 2 diabetes and its complications" ([diabetes.niddk.nih.gov](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5300333/)). The clearinghouse lists complications of diabetes as cardiovascular disease, kidney damage, blindness, and lower-limb amputations. Controlling blood glucose levels, blood lipid levels, and blood pressure may help reduce these complications.

Screening for diabetes is recommended for anyone who is obese and for those over age 45. Warning signs include excessive thirst, fatigue, unusual weight loss, blurred vision, and frequent infections. The CDC predicts that if the trends of overweight and lack of physical activity continue, 1 in 3 people will get diabetes and will lose 10–15 years of life as a result. The estimated number of new cases of diagnosed diabetes just for ages 18–44 years in 2020 was 29 million. Among U.S. adolescents ages 12–18 years, more than 1 in 6 (or 18 percent) have prediabetes.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Insulin Pump

An insulin pump is a medical device used to administer insulin to a person with diabetes (*Figure 19*). The pump is used instead of daily injections of insulin. The body needs a certain amount of insulin for normal functioning, and then it also needs insulin when food is eaten. Insulin pump therapy allows the insulin to be administered throughout the day and night for normal body functions. Then when you eat you can give a delivery of insulin—a “bolus”—to work with the food.

The insulin pump is about the size of a small cell phone. It is worn underneath the clothing in a leg or bra pouch, or on your belt like a phone. The insulin is delivered through a tiny, soft tube that connects to the pump. At the other end of the tube is a cannula about 1 inch long, which is inserted under the skin where it delivers the insulin. This is called an infusion set. There are different forms of these infusion sets from which to choose. They are usually inserted in the abdomen and last for about 3 days.

The pump delivers the basal rate of insulin needed every day. Currently, insulin pumps are the most accurate, precise, and flexible of the insulin delivery systems available. Insulin pumps integrate insulin therapy with continuous glucose monitoring to provide even better control and health.

**Figure 19.** An insulin pump delivers insulin just below the skin at the rate needed throughout the day for healthy glucose management.



# Arthritis

**Arthritis** means inflammation of the joints. This inflammation causes pain and may also cause swelling and stiffness. There are over 100 types of arthritis and other rheumatic diseases. All are painful but can be treated successfully.

Osteoarthritis and rheumatoid arthritis are the most common types of arthritis. Osteoarthritis—or degenerative arthritis—develops as the cushioning cartilage at the ends of bones breaks down resulting in a bone-on-bone situation. Osteoarthritis can be prompted by extreme wear on the larger joints (hips, knees, back), injury, and aging.

Rheumatoid arthritis, which affects women three times more than men, is an autoimmune disease that causes inflammation of the synovium—the lining around the joint. Rheumatoid arthritis can also be found in the blood, heart, or lungs. It can be extremely painful and cause disfigurement of the joints.

The third most common form of arthritis is gout. Gout is caused by high levels of uric acid that are deposited as crystals in the joints.

Years ago, it was thought that exercise would be harmful to the joints of someone with arthritis. Now the Arthritis Foundation not only recommends exercise to help prevent arthritis or reduce the symptoms of arthritis but has an online program called Let's Move Together Movement Tracker that helps to motivate people to exercise. Because arthritis can be so painful, a good place to begin to exercise is in the swimming pool. Water walking or water exercise is less painful because the buoyancy of the water takes much of the pressure off the joints. Stretching for increased flexibility and eventually weight training are all exercises that may help to strengthen the muscles around the joints, reduce the inflammation in the joints, and enhance overall wellness. Accompanying benefits that come with the exercise program may be less depression, increase in energy, and a brighter and more hopeful outlook for the future.

# Asthma

Changing from one's home environment to a college dorm or apartment can be especially challenging for a person with asthma. **Asthma** is a chronic inflammation of the airways of the lungs, which can cause airways to narrow, interfering with normal breathing. Some triggers that adversely affect the airways are dust, pollutants in the air, cigarette smoke, and animal dander. Asthma can also be aggravated by stress, cold air, and intense exercise.

There is no known cause or cure for asthma, but it can be controlled. For a person with asthma, it is especially important to establish a healthy lifestyle and a healthy environment. It is also important to establish a good rapport with the campus medical services and make sure that inhalers and medications are always readily available. Getting enough sleep, avoiding respiratory illnesses, and creating helpful exercise and nutrition regimens are important to help a person with asthma make a successful transition into college life.

The American Academy of Allergy, Asthma, and Immunology (AAAI) makes available annual tuition scholarships for high school students diagnosed with asthma. The awards are based on academic success, extracurricular activities, and involvement in the community. They can be used for accredited 2- or 4-year schools.

# Autoimmune Disorders

**Autoimmune disorders** are due to an overactive immune response of a person's body against itself—the immune system attacks the body's own healthy cells by mistake. The body attacks its own cells by making auto-antibodies, and the regulatory T-cells of the immune system do not perform their normal function.

Autoimmune diseases tend to run in families. It may involve certain organs or tissue in different places. Immunosuppression medication is used to decrease the immune response, and anti-inflammatory medication to decrease the inflammation.

There are about 80 known autoimmune diseases, including ankylosing spondylitis, Crohn's disease, Graves' disease, lupus, type 1 diabetes, and multiple sclerosis. Symptoms vary with each person and each disease, but there are some common symptoms:

- Inflammation
- Fatigue and malaise
- Dizziness
- Elevated body temperature
- Extreme sensitivity to cold in both hands and feet
- Weakness and stiffness in muscles and joints
- Weight changes
- Digestive or gastrointestinal problems
- Low or high blood pressure
- Irritability, anxiety, and depression
- Infertility

Of the nearly 25 million Americans with autoimmune diseases, women are afflicted two times more than men. African American, Hispanic American, and Native American women are at a higher risk. In many people, the initial symptoms are tiredness, muscle aches, and low-grade fever. The disease may flare up and then all but disappear. Auto-immune diseases do not usually go away, but their symptoms can be treated. Developing a healthy lifestyle will help—eat healthy well-balanced meals, get regular physical activity but do not overdo, get enough sleep, and reduce stress.

# Chronic Pain

A certain amount of pain is expected when healing from an injury or illness. But when the pain exceeds the normal time for healing, it can be called **chronic pain**. Chronic pain often affects older adults. Complaints include headaches, low back pain, cancer pain, arthritis pain, neurogenic pain, and psychogenic pain. Treatments include medications, acupuncture, psychotherapy, relaxation, biofeedback, and behavior modification. Studies have shown that people with chronic pain have lower than normal levels of endorphins in their spinal fluid.

# Meningococcal Meningitis

**Meningococcal meningitis** is a bacterial infection that causes inflammation of the membranes encasing the brain and/or spinal cord. The bacteria are transported in the blood. This is a rare disease, but there were about 375 cases in 2019 in the U.S. with about 10–15 percent of those cases resulting in death. Teens and young adults are two groups that are at highest risk.

The CDC reports that freshmen living in dorms have a 6 times' higher risk of contracting this illness than college students overall. An infected person transmits the disease through oral contact such as kissing or sharing items like drinking glasses. Symptoms mimic the flu. Because the disease progresses rapidly, it is important to seek medical help if you experience two or more of these symptoms: a severe headache, stiff neck, fever, nausea, vomiting, or lethargy. A meningococcal vaccine is available, safe, and recommended for college students.

## Metabolic Syndrome

**Metabolic syndrome**—or Syndrome X—is the precursor to diabetes. Metabolic syndrome is present when three or more of the following five disorders are present: high triglycerides, low HDL cholesterol, high blood sugar, high blood pressure, and an above-average waist circumference. Medically, insulin resistance and metabolic syndrome are the same things. Over time the faulty signals from the cells cause metabolic disorders and degenerative diseases.

The onset of metabolic syndrome usually occurs in an individual who has a low level of physical activity and a diet with a high glycemic load. These factors cause the body to produce high levels of insulin. Cells then build up a resistance to the high insulin levels, causing glucose to pass through the body without being absorbed. This is what is known as insulin resistance. Eventually, the pancreas decreases insulin production, even though the person continues to eat high levels of sugars and other carbohydrates. Combined, the low insulin level and high blood sugar level lead to diabetes.

Type 2 diabetes is generally diagnosed when fasting blood glucose has reached 126 mg/dL or higher, while 70–99 mg/dL are considered normal. Over time, poor insulin regulation can adversely affect many of the systems of the body. Current studies indicate that with proper diet, exercise, and weight management, more than 90 percent of type 2 diabetes cases can be eliminated.

Nutrigenomics studies how nutrients communicate with genes to prevent or induce diseases such as pre-diabetes, polycystic ovarian syndrome (PCOS), metabolic syndrome, and all types of diabetes. Micronutrient therapy is used to prevent and treat insulin resistance and can help reverse the problems associated with each of these conditions. Micronutrient therapy works system-wide at a cellular level. Micronutrients are vitamins, minerals, and other compounds the body uses in small amounts to regulate metabolism, including how sugars and other carbohydrates are converted into energy.

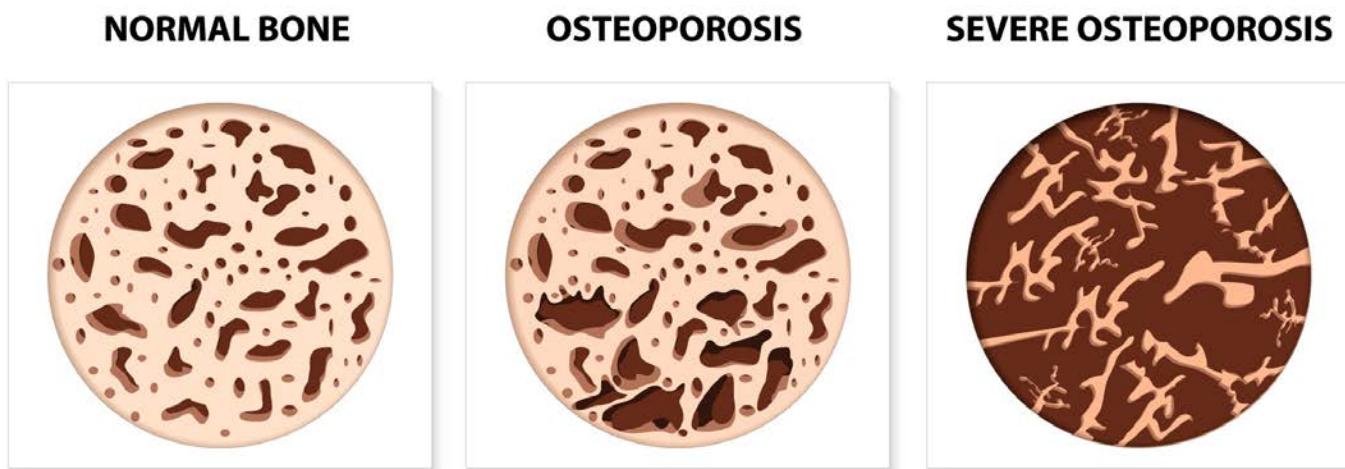
The following are some of the vitamins and minerals closely associated with insulin regulation:

- **Chromium Picolinate:** Reduces blood glucose, cholesterol, and lipid levels.
- **Magnesium:** Decreases the risk of getting type 2 diabetes, a key factor in the regulation of insulin.
- **Manganese:** May help protect LDL cholesterol from being oxidized and from forming plaques. Lower than normal levels are found in people with diabetes.
- **Vanadium:** Helps with the metabolism of glucose, lipids, and proteins, and increased insulin sensitivity in cells.
- **B Vitamins:** B3 (niacin) is vital for carbohydrate, fat, and protein metabolism; B6 (pyridoxine) protects from complications related to diabetes; B9 (folate) and B12 are necessary for the metabolism of homocysteine, which causes metabolic dysfunction. B12 (cobalamin) helps nerve cells function properly and keeps a person with diabetes from experiencing peripheral neuropathy (nerve damage, usually in the feet).
- **Vitamin C (ascorbic acid):** Has protective effects on the kidney, eyes, and nerves, and helps in the regulation of sorbitol.
- **Vitamin E:** An antioxidant that neutralizes the damaging free radicals produced during hyperglycemic states.

Good nutrition and physical activity go a long way to help prevent metabolic syndrome and eventual type 2 diabetes. Hopefully a healthy, active lifestyle will be your choice from this point on. Stay with this life-style and you will enjoy a quality of life that you are seeking.

## Osteoporosis

The National Osteoporosis Foundation (NOF) explains that **osteoporosis** is a disease in which bones become fragile and more likely to break (*Figure 20*). It is a metabolic bone disease in which bones lose density and the spaces within them become enlarged. It is easier to prevent than to treat.



**Figure 20.** Osteoporosis is the loss of hard bone matrix (the lighter tissue shown in this figure) and the accompanying larger void spaces within the bone (the darker areas).

Fractures typically occur in the hip, spine, and the wrist. Women are four times more likely than men to develop osteoporosis, but men can also contract this disease.

Building strong bones, especially before the age of 30, is the best defense against developing osteoporosis. A healthy lifestyle can be critically important for keeping bones strong. Osteoporosis is largely preventable for most people. These are the NOF's five steps to bone health and osteoporosis prevention:

1. Get your recommended daily amounts of calcium and vitamin D.
2. Engage in regular weight-bearing exercise.
3. Avoid smoking and excessive alcohol consumption.
4. Talk to your health care provider about bone health.
5. When appropriate, have a bone density test, take medication if needed, and make lifestyle changes.

Women are at greater risk of osteoporosis. Bone loss increases after menopause when estrogen levels decrease. Although more commonly seen in older, post-menopausal women, young women can also develop osteoporosis, usually due to disordered eating, low body weight, and amenorrhea (the cessation of menstruation).

Excessive exercise and dieting is a major contributor to osteoporosis. For example, people with eating disorders, such as anorexia, are at increased risk for osteoporosis. Low calcium levels caused by constant dieting and calcium loss through sweating during excessive exercise contribute to osteoporosis. Caffeine and phosphoric acid, which is found in carbonated soft drinks, can inhibit calcium absorption. Smoking and excessive drinking can also contribute to osteoporosis.

Many female athletes are anemic because their diets are deficient in iron. Anemia also contributes to amenorrhea and it is most prevalent in gymnastics, figure skating, and running.

The best time to prevent osteoporosis is during childhood. The National Academy of Sciences recommends that 8- to 18-year-olds need 1,300 milligrams of calcium every day. Weight-bearing exercise such as resistive exercise, jogging, tennis, step aerobics, and stair climbing help build denser bones. Don't smoke and maintain a healthy diet that avoids carbonated soft drinks, which contain phosphoric acid that is found to impair the body's ability to absorb calcium.

## HOW TO PREVENT CHRONIC DISEASE

Establish a healthy lifestyle! The two major long-term studies cited earlier in this chapter and many other similar studies give ample evidence that we truly can prevent chronic diseases from plaguing our lives. If each one of us would take responsibility to do what is being advocated by experts and researchers, we could drastically curb the prevalence of the diseases we have just studied (*Figure 21*).



**Figure 21.** Chronic disease does not have to be a given in your life—prevent it by developing a healthy lifestyle now, one that integrates mindbody wellness.

## Healthy Behavior Checklist for Reducing Chronic Disease Risk

If you use the science that is presented in this textbook, you will reduce your risk for chronic disease and other health problems. Nevertheless, here is a checklist of healthy behaviors that will help you avoid chronic disease:

- Begin with a clear understanding of the wholeness of your being and a genuine appreciation for your mind and body.
- Care enough about yourself that you really want to take care of yourself.
- If you smoke or are around smoke, do everything you can to eliminate this from your life. Avoid tobacco use.
- Avoid or limit alcohol and caffeine intake.
- Establish patterns of regular physical activity doing something you really enjoy every day. Make this a fun part of your life.
- Maintain a normal weight.
- Do all you can to get enough sleep every night.

- Find ways to relax, avoiding the negative effects of stress. Pursue hobbies or develop talents that add joy to your life and make your life interesting.
- Establish healthy, solid, and lasting friendships.
- Be confident that your life has a purpose, that your life is meaningful.
- In addition to the above healthy lifestyle behaviors that apply generally in all situations, there are a few specific ones pertaining to certain chronic diseases.

## Lifestyle Medicine Helps Avoid Chronic Diseases

Research has linked specific behaviors to increased risk for chronic disease. This section describes how healthy behaviors can reduce the risk for specific diseases.

### Cardiovascular Diseases

Eat a heart-healthy diet by reducing salt and saturated fat. Increase your fiber intake by eating a lot of vegetables, fruits, and whole grains. Monitor your blood pressure and your cholesterol levels, keeping them within normal ranges. Be sure to engage in enjoyable physical activity every day.

### Cancer

If you smoke or chew tobacco, stop. For women under 40, have a clinical breast exam as part of a regular health exam at least every 3 years. Women who are at high risk or are between the ages of 40–60 should have a screening mammogram and clinical breast exam every year. Perform monthly breast self-exams and consult a health professional if you note any changes that are of concern. Men should have an annual health exam that includes examination of the testicles and prostate. It is a fact that about one-third of cancer deaths each year are related to physical inactivity, poor nutrition, and overweight or obesity. Avoid indoor tanning and protect your skin from the sun's rays.

### Diabetes

Maintain a normal weight. Get at least 150 minutes of moderate physical activity each week. In a diabetes prevention program, 30 minutes a day of moderate physical activity coupled with a 5–10 percent reduction in body weight produced a 58 percent reduction in diabetes risk according to the American Diabetes Association. Blood glucose control reduces the risk for eye, kidney, and nerve diseases by 40 percent among people with diabetes.

Blood pressure control reduces the risk for heart disease and stroke among those with diabetes by 33–50 percent. It also reduces the risk for eye, kidney, and nerve diseases by about 33 percent. Detecting and treating diabetic eye disease with laser therapy can reduce the risk for loss of eyesight by about 50–60 percent. Comprehensive foot care programs can reduce amputation rates by 45–85 percent. Eat a healthy diet, limit sugar, and do not smoke.

### Depression

Physical activity and diet is shown to reduce the risk of depression. If you notice any of the common symptoms of depression, be sure to consult a mental health professional. Do not be reluctant to get professional help.

Depression may carry a high risk of suicide. Warning signs of potential suicide with depression include a sudden switch from being very sad to being calm or appearing to be happy, always talking or thinking about death, a worsening of clinical depression, tempting fate by taking risks, losing interest in things, putting affairs in order, changing a will, talking about killing one's self, and visiting or calling people one cares about. Go to the emergency room, call your local suicide hotline, or contact a mental health professional immediately if you see any of these warning signs in yourself or another person.

## Health Care Services to Reduce Risk

Regular health exams and screenings are important ways to detect health problems early, before the health issue becomes difficult and expensive to treat. The following are the basic primary care health services that you can expect to receive:

- Routine physical exams
- Physical exams for sports
- STD screens
- Women's Health (birth control, PAP smears, colposcopy)
- Immunizations; travel requirements
- Allergy shots
- Management of depressions and anxiety
- Help with insomnia
- Attention to skin conditions

Urgent care health services usually include treatment for:

- Colds, flu, sinus infections
- Strep throat
- Mono
- Gastroenteritis
- Urinary tract infections
- Upper respiratory infections
- Asthma-related problems
- Migraine headache
- Minor injuries such as lacerations, fractures, concussion, wound infections

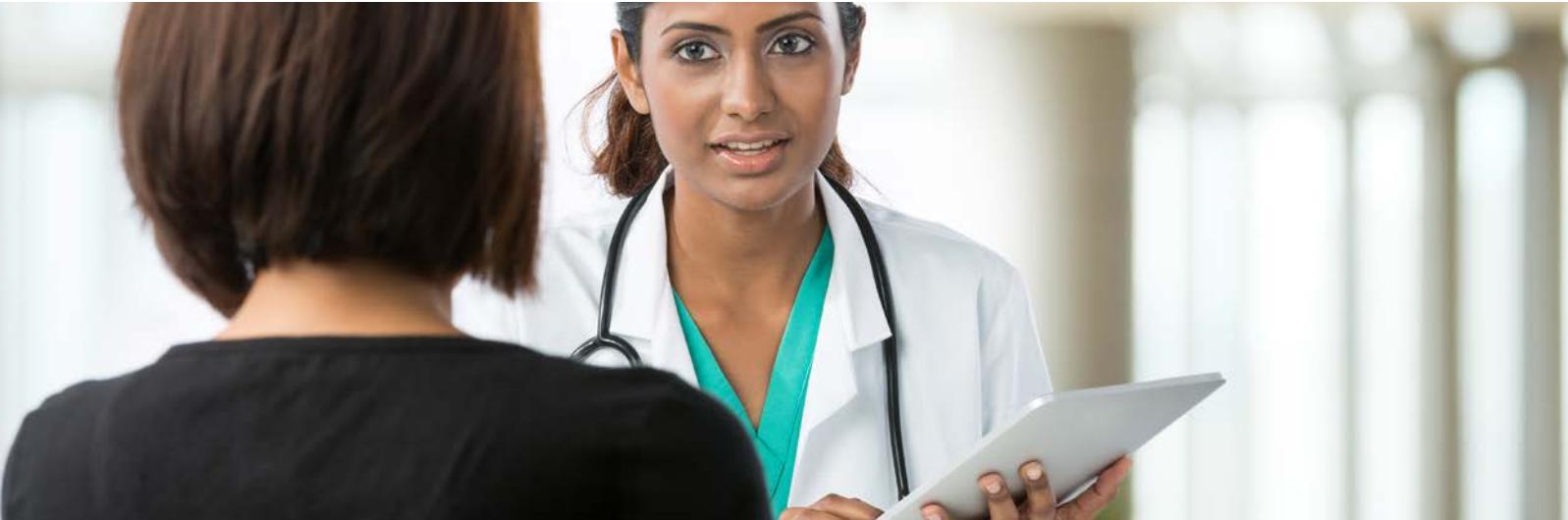
The emergency room staff should refer a person to a local hospital for more serious, but less urgent, cases.

## Questions for Your Physician

If you consult a doctor about a health problem, these are some basic questions you should ask before receiving treatment (*Figure 22*):

- What is causing this problem?
- Could there be multiple causes or diseases?
- What tests will you do? Are there risks associated with these tests?

- What treatment options do I have? Are there risks associated with these treatments?
- What is the long-term outlook with and without treatment?
- Will there be complications with any of the herbs, supplements, or medications I am currently taking?
- What are all the possible effects of the treatment?
- What can I do on my own to help me return to normal health?



**Figure 22.** Don't be afraid to ask your doctor questions during your visit. Remember, you and your doctor work together as a team to keep you healthy and active.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Chronic Disease and Physical Activity

As a doctor deals with a patient with a chronic disease, many consequences observed are similar to a person in poor physical shape. They often have poor cardiac health, poor muscle tone, little strength, and tend to be overweight. They fatigue easily, are not active, and tend to have a poor quality of life. If they can exercise, they will be able to overcome these consequences of poor conditioning. They may also be able to better respond to their treatment and therapy.

With advances in medicine, patients with chronic diseases are living longer than ever. Exercise may very well improve the quality of life for these individuals. Little conclusive research has been done on the amount and kind of exercise that would be most beneficial—this is a difficult population to study. According to Dr. Patricia Painter, involvement of exercise professionals in the care of those with chronic diseases is long overdue. Hopefully, this will become common practice and covered by third-party payers.

## Medications and Their Long-Term Effects

Medications and prescription drugs have specific effects on individuals. The effects that are not the intended main effect of the drug are called side effects. There are also long-term effects that vary from individual to individual, depending on the intensity of the drug. All medications have side-effects.

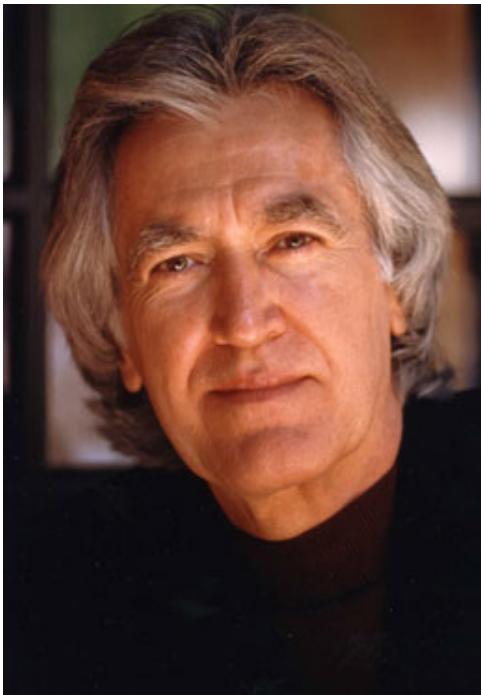
The non-steroidal anti-inflammatory drugs (NSAIDs) can be sold over-the-counter or be prescribed by a doctor. These are usually used to relieve back pain, joint pain, and other muscle pain. Damage to the liver or to the stomach can occur with long-term use. These and other painkillers, especially narcotics, can be addictive, creating a dependency on the drugs. Currently, prescription drug abuse is a major problem for many individuals worldwide.

Weight gain often accompanies use of prescription steroids as well as antidepressants that are selective serotonin reuptake inhibitors (SSRIs). These can also lead to insomnia and sexual dysfunction. Most of these medications are prescribed for acute pain or for short-term use. If used over a long period of time, medications may create problems for patients.

## HEALING WITH MIND, BODY, AND SPIRIT

When faced with the prospect of healing from a serious condition yourself or helping another to heal, be open to the reality of the whole being—body, mind, and spirit. We can cite thousands of accounts in which belief played a positive role in healing. The power is in the belief. There may be little in common about what is believed, but the common ground is in positive thought, optimism, and hope of those being healed.

Unfortunately, in many circles, particularly medical and academia, it is not readily accepted to talk about that which we cannot explain in physical terms. Dr. Larry Dossey, a medical doctor who has been both praised and criticized, and a proponent of the mindbody approach, gives a poignant example of this reluctance in his book, *The Power of Premonitions*.



*Larry Dossey, M.D.*

# Positive Thought, Optimism, and Hope

Dossey tells of a world-renowned neurosurgeon who never seemed to lose a patient. He was at the peak of his profession, had a loving wife, and wonderful children. Yet he had severe headaches that were destroying his life.

He sought help from psychoanalyst Elizabeth Lloyd Mayer. Among her many questions, she asked the doctor if he still taught classes. He didn't, although he loved teaching as much as he enjoyed doing surgery. He disclosed to Mayer what he'd never told anyone—that he stopped teaching because he no longer believed he could teach what he does. He told Mayer why his patients don't die—as soon as he learns that someone needs surgery, the doctor goes to the patient's bedside and sits at his or her head, sometimes for 30 seconds, sometimes for hours. He waits for a distinctive white light to appear around the patient's head. This was something he couldn't possibly admit to surgery residents, much less teach them. Until the white light appears, he knows it is not safe to operate. Once it appears, he knows he can go ahead and the patient will survive.

## The Power of Hope: It's Not Crazy

What would the residents think? They'd think he was crazy. Maybe he is crazy. But crazy or not, he knows that seeing the white light is what saves his surgeries from disaster. So how can he teach and not talk about it? It's a horrible dilemma. He's adopted the only possible solution—he quit teaching.

Mayer didn't reveal whether the neurosurgeon's headaches improved, or if he owned up to his experiences and went back to teaching. Instead, she painted a vivid picture of his dilemma. She concluded, "The neurosurgeon with his headaches was an emphatic demonstration of how the fear of appearing incredulous or crazy leads many people to disavow their reality, which can paralyze their creativity, conscience, and freedom to be themselves."

Dossey went on to say that Jeffrey S. Levin, a pioneer in consciousness-related medical research, has documented thousands of studies that show that those people who follow a purposeful, meaningful, or spiritual path throughout their lives have healthier lives than those who do not. Healing is about much more than medication.

## Disease Care Versus Health Care System

Heart disease, obesity, diabetes, prostate cancer, and breast cancer are preventable for the most part, and through a change in lifestyle are even reversible. Approximately 75 percent of healthcare costs are a result of these diseases. If we are oriented to think that our health is in the hands of our physicians, it may take a completely new mindset to realize that our own lifestyle behaviors can keep us from being terribly ill or from dying prematurely. It may be difficult to believe that if we are grateful to be who we are, body, mind, and spirit, if we respect ourselves and do not smoke or abuse alcohol or drugs, are physically active, eat well, have healthy relationships, and avoid the negative effects of stress, these behaviors are powerful and could augment traditional medical interventions.

# MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Plan now to choose to live a healthy lifestyle.
2. Commit to maintaining this lifestyle throughout your life.
3. Be positive. Enjoy being healthy.
4. Help others around you to make healthy choices.
5. Respect those with physical or mental chronic diseases.
6. Let your knowledge reduce prejudices.
7. Be a policymaker and help us move from a disease care system to a health care system.
8. Even if dealing with a chronic disease, help make life positive.

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## GLOSSARY TERMS

**Acute disease:** A short-term illness that manifests itself quickly.

**Aneurysm:** A weakened place in the wall of an artery, vein, or the heart.

**Angina pectoris:** Severe sudden chest pains usually occurring at rest; a symptom of myo-cardial ischemia.

**Anxiety disorders:** A disabling disorder characterized by inordinate fears, worries, and accompanying physical symptoms.

**Arteriosclerosis:** Hardening of the arteries.

**Arthritis:** Inflammation of the joints.

**Asthma:** A chronic inflammation of the airways of the lungs, which can cause airways to narrow and interfere with normal breathing.

**Atherosclerosis:** A form of arteriosclerosis due to deposits of fat, cholesterol, or other substances on the inner lining of the arteries making them thick and irregular.

**Autoimmune disorder:** A condition in which the body's immune system attacks the body's tissues.

**Benign tumors:** Tumors that pose no threat to a person's health in and of themselves but are problematic if they cause pain or disruption of body functions.

**Biopsy:** Extraction of sample tissue from the area of concern.

**Blood pressure:** The pressure created when the pumping action of the heart exerts a force on the walls of the blood vessels.

**Cancer:** Diseases in which normal cell growth becomes disruptive and out of control.

**Carcinogens:** Substances that cause cancer or foster cancerous growth.

**Carcinomas:** Tumors that begin in the cells that line an organ.

**Cardiovascular disease (CVD):** Heart disease involving both the blood vessels and the heart.

**Chronic pain:** Pain that persists longer than 12 weeks.

**Coronary artery disease (CAD):** A type of atherosclerosis that can result in heart attack or heart failure.

**Chemotherapy:** The administration of chemicals to destroy cancer cells.

**Chronic disease:** A long-term illness that develops over time.

**Congestive heart failure:** A form of heart failure characterized by excess fluid in the lungs and other parts of the body.

**Coronary heart disease (CHD):** The atherosclerotic narrowing of the coronary arteries.

**Coronary occlusion:** An obstruction of blood flow usually due to a blood clot that causes a heart attack.

**Depression:** An illness that disrupts normal functioning, characterized by sadness, feelings of hopelessness, helplessness, and excessive guilt.

**Diabetes mellitus:** A disruption of insulin production (type 1) or insulin utilization (type 2).

**Diastolic blood pressure:** The bottom number of a blood pressure measurement; the pressure of the blood when the heart's ventricles are relaxed.

**Embolism:** When a particle (an embolus) lodges in a narrow vessel blocking circulation.

**Heart failure:** Inefficient action of the heart so that it does not pump out all the blood that is returned to it.

**Hemorrhagic stroke:** When a blood vessel leaks blood into the brain.

**Hypertension:** Chronic high blood pressure.

**Ischemic stroke:** When a blood clot keeps blood from reaching the brain.

**Malignant tumors:** A mass of out-of-control cells that continues to grow and may invade other tissues and parts of the body.

**Mental illness:** Mental health disorders that affect mood, emotions, ability to think, perceptions, and behaviors.

**Metabolic syndrome:** A group of five factors that increase risk for heart disease and other health risks.

**Metastasis:** Cancer that has formed new tumors in a different location from which it started.

**Myocardial ischemia:** When the heart muscle is getting insufficient blood and oxygen and, therefore, cannot function properly.

**Osteoporosis:** The loss of hard bone matrix that causes bones to become brittle and fragile.

**Peripheral artery disease (PAD):** Atherosclerosis that affects the arteries in the limbs and other areas outside the brain and the heart.

**Plaque:** Deposits of fat, cholesterol, or other substances on the inner lining of the arteries during atherosclerosis.

**Radiation:** A cancer treatment that creates ions in the cells.

**Stroke:** A condition that results when blood does not reach the brain or blood is leaked into the brain.

**Systolic blood pressure:** The upper number of a blood pressure measurement; the pressure of the blood when the heart's ventricles contract.

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## Infectious Diseases and Your Immune System

# How Do I Defend Against Infections?

At the beginning of the 20th century, Americans died in great numbers from infectious diseases that we barely think about today. Diseases such as tuberculosis, diphtheria, influenza, and pneumonia were among the leading killers of the time. In the early years of the 21st century, even with improved sanitation and vaccines that help prevent them, infectious diseases are still a menace to Americans. COVID-19, influenza, Zika, and “superbugs” like MRSA are ever-imminent threats.

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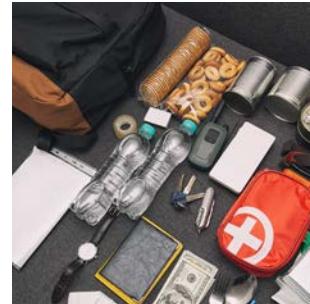
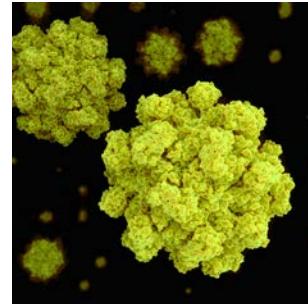
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A strong immune system is your best defense against infectious diseases. Your immune system works constantly to repel infections and keep you healthy, but it needs support to stay strong. This means eating healthy, exercising, avoiding risks such as tobacco and alcohol use, getting enough sleep, and practicing good hygiene every day. It also means knowing when and why to see your doctor and keeping your vaccinations up to date.



## After reading this chapter, you will be able to:

- › **EXPLAIN** how pathogens infect humans and how infectious disease can spread from one person to another.
- › **IDENTIFY** common pathogens that infect people and the diseases that those pathogens cause.
- › **EXPLAIN** why vaccines are an important defense against infectious diseases.
- › **DESCRIBE** how your immune system defends against infection.
- › **EXPLAIN** how to maintain a healthy immune system.



**Figure 1.** Certain types of bacteria, such as *Escherichia coli*, thrive in your body and aid in digestion. Some forms of the same bacteria, however, can make you sick.

# How Do I Defend Against Infections?

## infectious diseases and your immune system

## INFECTIOUS DISEASES AND HOW THEY SPREAD

The number of infectious microscopic organisms—or *microorganisms*—that thrive all around us, and even inside of us, is mind-boggling. Considering the sheer numbers, it’s surprising that we all aren’t sick all the time! Luckily, however, not all microorganisms cause diseases. Most of these tiny organisms are either harmless or beneficial to animals, people, or the environment. In fact, billions of microscopic organisms, primarily bacteria, thrive on your skin and inside your body without causing any harm (*Figure 1*). Some of these “germs” are required in certain bodily processes, such as digestion, and your health would suffer if they were to suddenly disappear.

Only a small fraction of microorganisms are *pathogenic*, meaning they can make you sick. Fortunately, if you’re reasonably healthy and lead a reasonably healthy lifestyle, you aren’t too likely to get sick very often. Illness usually happens when a person is exposed to a pathogenic microorganism that the body can’t fight off, or when the infectious agent multiplies itself faster than the body can react to it. Several factors contribute to your body’s response to an invading microorganism, including your overall health, the state of your immune system, whether you’ve been infected by the same microorganism before (in some cases), and if you’ve been vaccinated against it.

The following sections provide an overview of infectious diseases, introduce you to disease-causing microorganisms, and explain some of the ways in which infectious diseases spread.

# What Is an Infectious Disease?

An **infectious disease** occurs when the body is invaded by a **pathogen**, which is a microscopic organism—a **microorganism**—that causes a disease. (A disease caused by a microorganism may also be called a **pathogenic disease**.) When a pathogen takes up residence in the body, the result is an **infection**. Infections that affect only one body part or one organ are called *localized* infections, such as a scratch or a bug bite that becomes infected with bacteria (*Figure 2*). An infection that spreads through an organ system—such as the intestinal tract or the upper respiratory system—or the entire body is called a *systemic* infection, especially when it enters the bloodstream. Diseases such as AIDS and rheumatoid arthritis are systemic infections.



**Figure 2.** An infection that is limited to a single part of the body, such as an eye infection, is said to be *localized*.

Pathogens are grouped into categories based on their structure, the way they function, and other characteristics. The pathogens discussed here include:

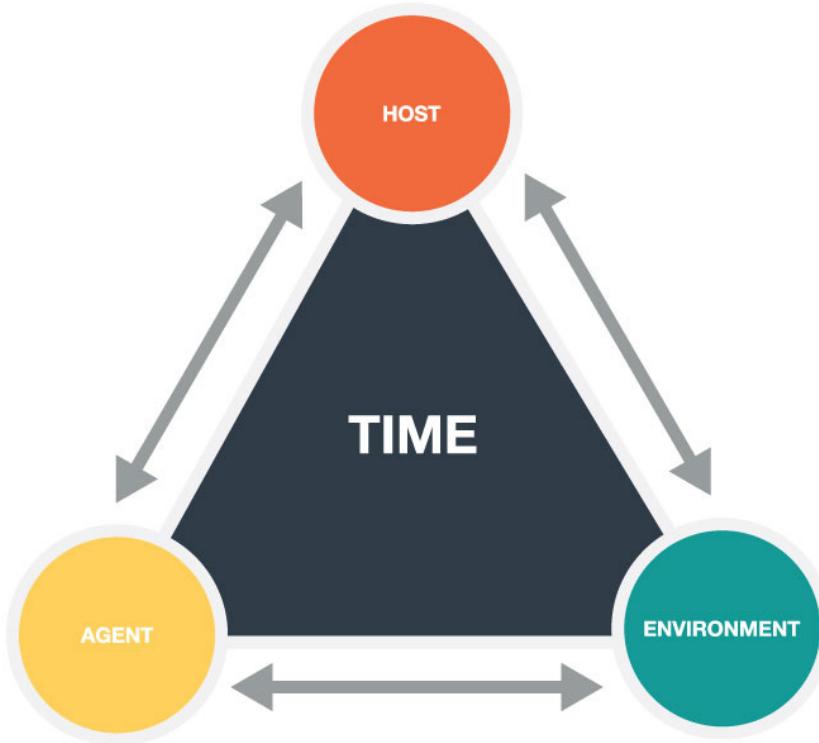
- Bacteria
- Viruses
- Fungi
- Parasites
- Prions

Specific pathogens of concern to humans are described in greater detail in “Microbes That Cause Infection.”

## The Path to Infection

For centuries, people have been curious to understand how diseases work and to explain why one sick person can make a lot of other people sick. The study of disease prevalence (total number of cases in a population), incidence (number of new cases in a population), transmission, and control of diseases is called **epidemiology**, and it has become a critical part of the field of medical science. Understanding the infection process is a cornerstone of effective disease-prevention efforts. The following sections explain this process in basic terms, to help you in your personal effort to avoid infections yourself.

Epidemiologists have created models to help study infectious diseases and explain how they work. Two key models are the Epidemiologic Triangle and the Chain of Infection.



**Figure 3.** The Epidemiologic Triangle identifies the three components of the spread of infection.

## The Epidemiologic Triangle

In the **Epidemiologic Triangle**, each corner represents one of the three key players in the spread of infection (Figure 3). These players are:

- The *agent*, which causes the disease. Typically, the agent is an infectious microorganism.
- The *host*, which is the person (or an animal) that is exposed to infection from the agent and then carries the disease. The host may or may not be sickened by the infection but may be able to transmit it to other people either way. Some diseases are not transmittable unless the host is suffering from symptoms, such as a fever.
- The *environment*, in which the agent and host meet and includes the factors that enable a disease to be transmitted. These factors are external and separate from the agent and the host. An example of such an environment is a place with inadequate sanitation, which allows agents to exist in improperly treated water. People in such an environment may be susceptible to a variety of water-borne infections.

A fourth factor in the triangle is *time*, which is usually represented by the center of the triangle. Time is an important contributor to the spread of infection. For example, agents may need a certain amount of time to take up residence in an environment, to incubate, or to be inside a host in order for the host to get sick or become contagious. Time is also a factor in determining when a local infection involving a few people expands into an **epidemic**, affecting a large number of people in a given geographic area.

## The Chain of Infection

Another epidemiological model describes the infection process as a **Chain of Infection**. The chain begins with infectious agents residing in different types of **reservoirs**, such as humans, animals, or water, and then using a specific **mode of transmission** to reach a host. The agent then exits from the reservoir through a **portal of exit** and invades the host through a **portal of entry**. Key modes of transmission include:

- **Person-to-Person Contact.** You know from experience that close contact with a sick person can also make you sick. This is because the infectious agent may be present on the person's skin or in their saliva, mucus, blood, or other bodily fluids. If you touch someone who is sick and then touch your own face, you may transport the infectious agent right to your own mouth, nose, or eye. This is why it's important to be more careful around sick people, and when you are around sick people you should wash your hands frequently, and never touch your face with unwashed hands. It's also why you should never share drinking cups or eating utensils with someone who is sick.
- **Food.** Foods and beverages are common vehicles for infectious agents, especially germs such as *E. coli* and *listeria*, which are common causes of food poisoning. Food can become contaminated in the field, during transport, and during handling or preparation. The best way to avoid food-borne infections is to always practice safe food-handling techniques, which includes keeping surfaces and utensils clean, and frequent hand-washing.
- **Water.** Like humans, water is a reservoir for infectious agents, but it can also be a mode of transmission. Drinking or swimming in contaminated water can lead to infection by a wide range of agents, including bacteria and parasites.
- **Air.** If a sick person coughs or sneezes, the droplets fly from their nose or mouth by the millions and travel a considerable distance. Inhaling these droplets, or getting them in your mouth or eyes, can transmit the infection to you. Many pathogens can "travel by air," too. Fungi, such as mold spores, are commonly carried in the air, waiting to be inhaled or deposited on your skin.
- **Vector.** A **vector** is any kind of intermediary that can transfer an infectious agent to a host. For example, mosquitos are a notorious vector for diseases such as Zika, bird flu, and malaria. Contaminated surfaces are another type of vector; if you touch a doorknob that was touched by someone who is sick, you may pick up a bug.
- **Mother-to-baby (perinatal) transmission.** The term *perinatal* refers to the moments just before and after childbirth. If the mother is infected with a pathogen, it may be transferred to the newborn in those moments. (This type of transmission is also called *vertically transmitted infection*.) This is not true in all cases, but for some pathogens, especially HIV/AIDS and hepatitis, doctors take extreme precautions to prevent transmission to the child.

## Risk Factors

A variety of factors influence your risk for infectious diseases. Of course, the most important factor is the health and strength of your own immune system; that topic is discussed later in this chapter. For now, let's look at a few other key factors that can increase or decrease your risk of infection.

### Age

Generally speaking, children younger than 5 and adults over 65 have a much higher risk of infection than the rest of the population. In young children, immunity to diseases is still developing, which is why vaccinations can be important for them. The immune system tends to weaken with advancing age, leaving older people more vulnerable than younger persons. This fact, coupled with factors such as existing health problems, poor nutrition, and lack of exercise, can make elderly adults especially vulnerable to infections (*Figure 4*).



**Figure 4.** Our immune system naturally weakens as we get older, leaving us more vulnerable to infections of all kinds.

## Vaccination Status

The reason health care professionals encourage everyone to get vaccinated is simple: vaccines work. Because of nationally coordinated vaccination efforts, the medical community has eradicated polio, smallpox, and measles from the United States, and a few other diseases, such as mumps, are now rare. In countries where vaccinations are not as strongly encouraged or available, highly controllable diseases are still endemic. Of course, some people cannot have vaccinations due to other health conditions or allergies to the ingredients in vaccines. Still, if everyone else in the community is vaccinated, they create a "herd immunity" that can help protect the unvaccinated from infection. The more unvaccinated persons in a community, the greater the likelihood that infection will strike and spread, making herd immunity less protective. No vaccine offers 100% protection and the efficacy of the vaccine can vary depending on other health-related variables such as age and health status

## Environment

Your environment has a significant impact on your risk of infection. For example, people who don't have access to reliably clean water are more prone to water-borne infections (**Figure 5**). As already explained, if you don't have all your vaccinations, and neither do many of your neighbors, then your risk of infections is higher than they would be if everyone was vaccinated.



**Figure 5.** Unsafe water poses a variety of threats to humans and wildlife alike.

## Organism Virulence and Resistance

If an infectious agent is strong, has a suitable environment to thrive in, and a suitable host, it can replicate and spread quickly. This ability is called **virulence**, and it helps determine how quickly and how seriously a pathogen can make you sick. Another important risk factor is antibiotic resistance; as described later in this chapter, some bacteria have developed resistance to antibiotics that once killed them. If you are infected with a resistant strain of bacteria, your infection will be more difficult to treat and may last longer and become more serious than a treatable infection.

## MICROBES THAT CAUSE INFECTION

Microscopic organisms are sometimes called microbes, but most people just call them germs. They are everywhere, on every surface you touch (unless it has been sanitized), in the air you breathe, and in the water you drink (unless it's sterile). But that's OK because most microbes are beneficial in one way or another, or just plain harmless.

Before exploring the ways microorganisms cause harm, let's look at some of the ways they benefit people and our planet:

- **Food production.** People use microbes to produce fermented foods and beverages, such as sauerkraut and wine. Certain microbes give cheeses their characteristic flavor, aroma, and texture. Microorganisms such as yeast make dough rise to create bread.
- **Decomposition.** Naturally occurring microorganisms speed the breakdown of dead things to return them to the soil, so they can contribute to new growth. Many man-made products also decompose with the help of microbial activity, especially biodegradable materials that are designed to take advantage of this natural process (*Figure 6*).
- **Medicine.** Scientists have long used germ warfare to fight germs. Many beneficial drugs, such as penicillin, have been derived from microbes or the by-products of their activities.

People have been using microorganisms in manufacturing, science, agriculture, and other fields for generations.



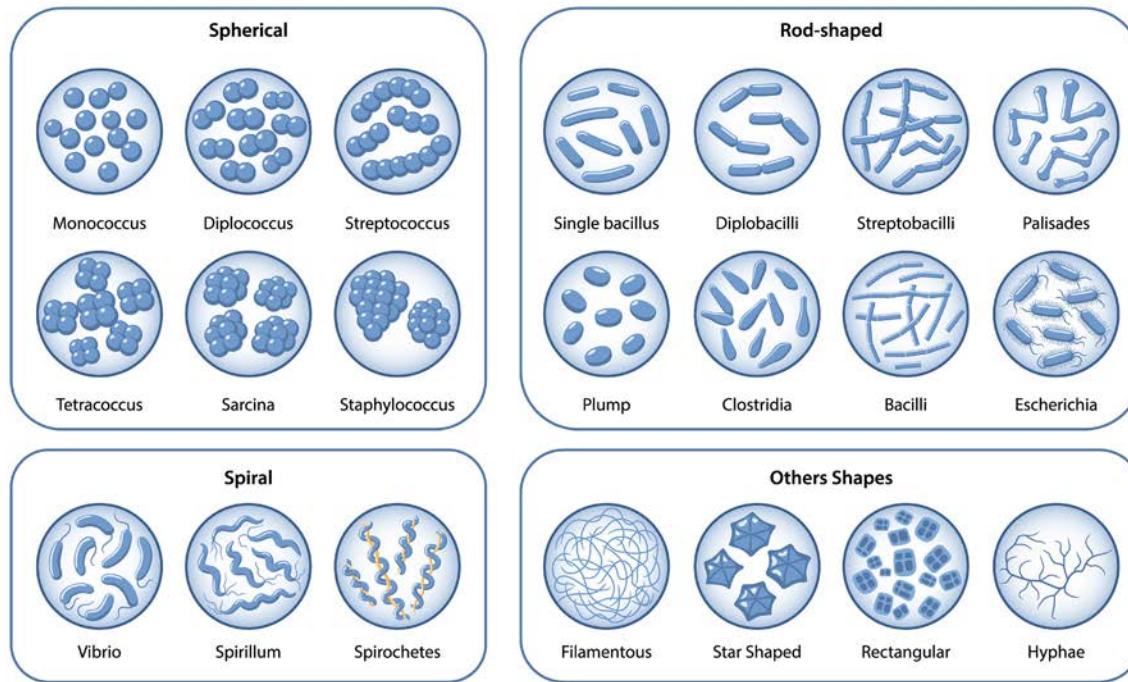
**Figure 6.** Composting—which many people practice in their backyard—relies on microorganisms to break down kitchen waste to enrich the soil.

# Bacteria

By the billions, **bacteria** thrive on our skin and inside our digestive tract, and live pretty much everywhere, waiting to be picked up through the slightest contact (*Figure 7*). These single-cell organisms are tiny; if you lined up 1,000 bacteria, they would only stretch across the end of a pencil eraser. But bacteria are plentiful and prefer to live in large numbers, called *colonies*. A single gram of soil holds about 40 million bacteria cells; a milliliter of fresh water can contain about a million bacteria. In fact, bacteria are one of the most plentiful, if not *the* most plentiful, life forms on our planet. One estimate contends that 5 nonillion bacteria are living on Earth at any given moment. A *nonillion* has 30 zeros! (When talking about just one of these germs, use the term *bacterium*.)

Bacteria are extremely hardy creatures. Some types of bacteria float around in the atmosphere (as high as 30 miles) and thrive in the most inhospitable depths of the ocean. They can even linger in supposedly sterile places, such as hospital operating rooms.

Most of the bacteria we carry around every day are harmless, and some are even important to our survival because they aid in bodily processes such as digestion and vitamin production. Only about 1 percent of bacteria, like *staphylococcus* or *E.coli*, are harmful. Bacterial diseases include cholera, diphtheria, the plague, and tuberculosis, among others. Bacterial STDs include chlamydia, gonorrhea, and syphilis.



**Figure 7.** Bacteria are categorized by their shapes: spherical, rod, spiral, comma, and corkscrew.

The following sections describe a few common bacterial illnesses. These infections can be serious in nature and, in some cases, difficult to treat.

## Intestinal Illnesses

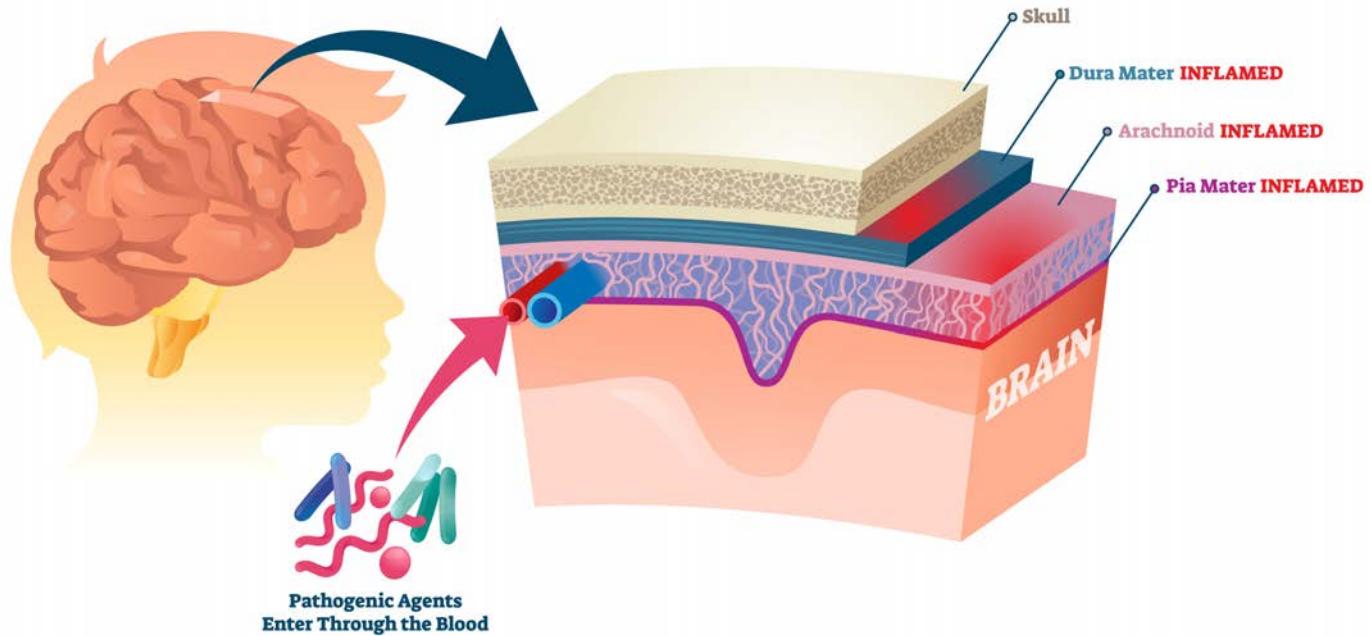
The bacterium *Clostridium difficile* (also called *C. diff*) causes serious intestinal illnesses, including colitis and diarrhea. Symptoms include watery diarrhea that lasts for 2 days or longer, fever, loss of appetite, nausea, and abdominal pain. *C. diff* infections are most common among people who have been taking antibiotics for an extended period of time and are increasingly spread in health care settings. Elderly persons are most susceptible to infection.

*C. diff* can survive a long time outside the body on surfaces that have not been thoroughly disinfected. This bacterium can be treated with antibiotics; in rare cases, extreme infections are treated with surgery to remove the infected section of intestine. Thorough hand washing, and disinfecting of surfaces are the best ways to prevent *C. diff* from spreading.

Another type of bacterium, *Escherichia coli* (more commonly called *E. coli*) resides in your intestines. Although most kinds of *E. coli* are harmless, a few varieties can cause intestinal illnesses. An infection with harmful *E. coli* can cause fever, fatigue, nausea or vomiting, cramps, and watery or bloody diarrhea. *E. coli* infection is a type of food poisoning because it comes from eating foods that contain the bacteria. Most *E. coli* infections resolve in about a week without treatment, but severe cases require medical care. The best way to avoid infection is by practicing food safety, which means thoroughly washing produce, cooking meat thoroughly, and avoiding unpasteurized products.

## Bacterial Meningitis

**Meningitis** is an infection that causes swelling and inflammation of the membranes (the *meninges*) that surround the brain and spinal cord (*Figure 8*). Although most people recover from meningitis, it can be lethal, causing death in a very short time unless it is diagnosed and treated quickly. Meningitis can be either bacterial or viral, but it also can result from injury, cancer, and the use of certain drugs. Bacterial meningitis most commonly occurs in children and teenagers but can also affect adults. Meningitis often occurs among groups of people who live in close contact, and small epidemics in university dormitories and on military bases are not uncommon.



**Figure 8.** Various structures surrounding the brain are affected by meningitis.

Symptoms of bacterial meningitis include fever, nausea, vomiting, bruising, rash, severe headache, sensitivity to light, and stiffness of the neck. People suffering from meningitis sometimes experience changes in their mental state and behavior.

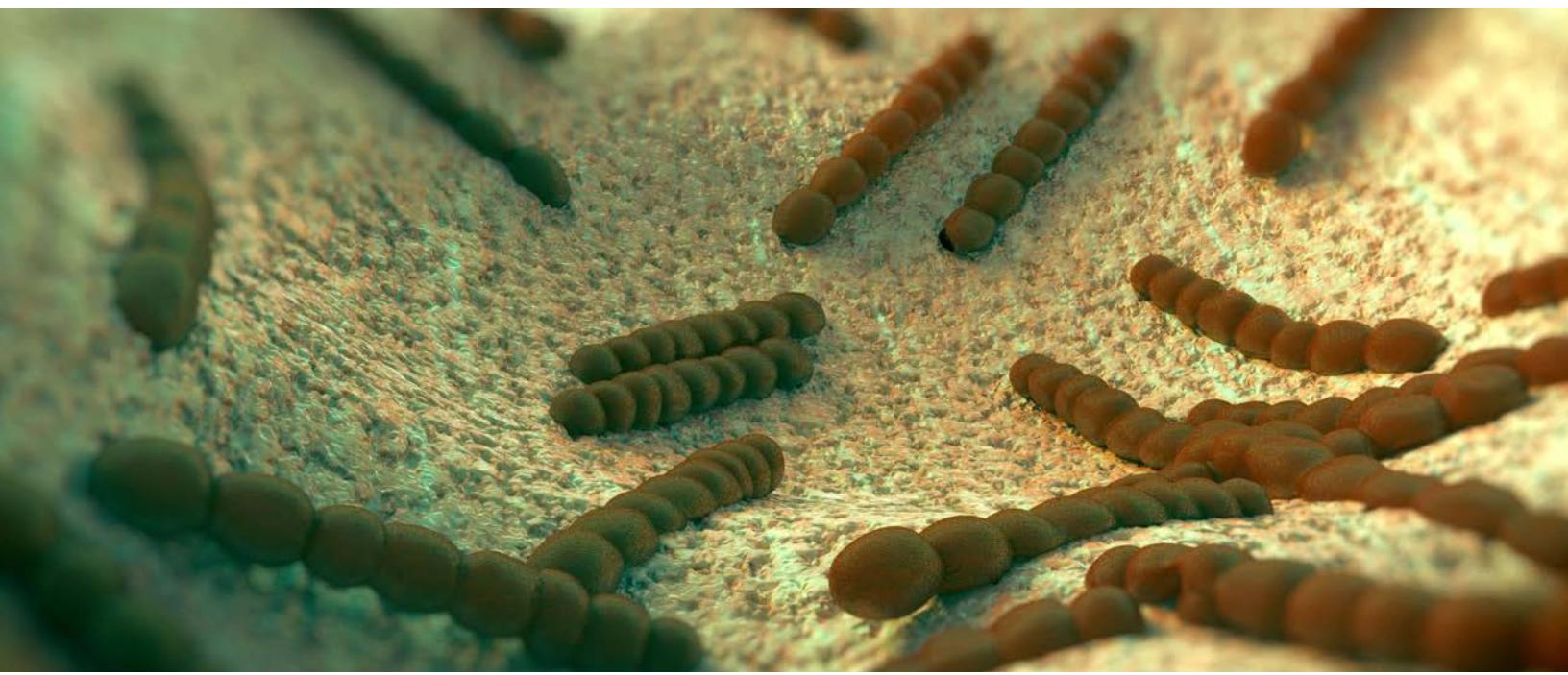
In the United States, the meningococcal bacterium *Neisseria meningitidis* is the most common cause of bacterial meningitis (called *meningococcal meningitis*), but the disease also can be caused by other types of bacteria, including the bacterium that causes pneumonia. Medical tests can confirm a bacterial meningitis infection, and the disease can be treated with antibiotics. Vaccines are available to prevent bacterial meningitis infection from *Neisseria meningitidis*, *Streptococcus pneumoniae*, and *Haemophilus influenzae type b (Hib)*.

## Bacterial Pneumonia

An infection of the lungs that affects people of all ages, **pneumonia** can be bacterial or viral, and can also be caused by exposure to certain fungi or by inhaling a liquid or certain chemical fumes. Influenza and autoimmune diseases also can lead to pneumonia. Pneumonia infection ranges from mild to severe. While there are several different types of pneumonia, symptoms typically include high fever, cough, chills and shaking, and difficult or painful breathing. Depending on the cause, pneumonia symptoms can also include dark or red *sputum* (mucus coughed up from the trachea and lungs), diarrhea, vomiting, and decreased consciousness.

Worldwide, pneumonia accounts for about 4 million deaths each year, and it is the leading infectious cause of death of children under age 5.

In the United States, *Streptococcus pneumoniae* (**Figure 9**) is the leading cause of bacterial pneumonia; *Mycoplasma pneumoniae* causes a mild form of the illness, known as “walking pneumonia.” Medical experts recommend that every American get an annual flu shot to avoid influenza infections, which may lead to pneumonia. There are also pneumococcal vaccines that reduce the risk of bacterial pneumonia; a pneumococcal vaccine is recommended for anyone at risk for pneumonia and especially for children younger than 5 and adults over 65. Doctors also recommend that everyone stay up to date on their schedule of regular vaccines, as they prevent other diseases—such as pertussis, measles, and chickenpox—which also can lead to pneumonia.



**Figure 9.** *Streptococcus pneumoniae* causes bacterial pneumonia in humans.

## Tuberculosis

**Tuberculosis (TB)** is a bacterial disease that most often affects the lungs but can affect other parts of the body. TB spreads from person to person through the air; when someone with TB coughs or sneezes, infected droplets can be inhaled by others. Symptoms include a cough that lasts 3 weeks or more, coughing up mucus or blood, chest pain, fever, weakness or tiredness, loss of appetite and an associated loss of weight. TB can be deadly if it is not treated promptly. No vaccine for TB is offered in the United States.

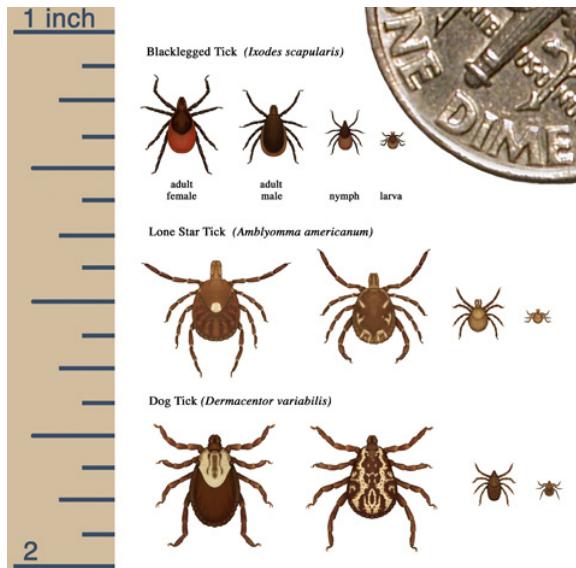
Tuberculosis takes two forms: *latent TB* and *TB disease*. Latent TB takes up residence in the body but does not become active; that is, it does not start multiplying right away. A person with latent TB doesn't feel sick and can't spread the disease to other people. However, latent TB can become active in the body at a later time, becoming active TB disease.

Anyone can catch TB, but people who are recently exposed to the bacteria or have a weakened immune system are at greatest risk for active TB disease. If you think you have been exposed to someone with active TB disease, ask your doctor about getting tested. Both latent and active TB are treatable with a wide range of antibiotics, but treatment takes a long time. Treatment for active TB can last up to 12 months.

Tuberculosis is caused by the bacterium *Mycobacterium tuberculosis*. TB has evolved into drug-resistant forms, making treatment more difficult. *Drug-resistant TB* does not respond to treatment with at least one of the commonly used antibiotics. *Multidrug-resistant TB* resists more than one of the antibiotics. *Extensively drug-resistant TB* resists nearly all of the drugs used to treat TB, but fortunately is extremely rare. Treatment can also become complicated in patients who are already infected with HIV or another illness that weakens the immune system.

## Tick-Borne Diseases

A **tick** is an insect that feeds by climbing onto a warm-blooded animal, burying its head under the host's skin, and feeding on the host's blood (*Figure 10*). Ticks can carry a wide variety of diseases (the type of disease typically depends on the type of tick and its geographic habitat) that can affect humans. Some tick-borne diseases can have serious long-term effects and are difficult to treat.



**Figure 10.** Ticks are tiny and can be very hard to detect.

The best way to avoid tick-borne diseases is to avoid tick-prone areas and to take precautions that prevent ticks from latching onto your skin. When walking in natural areas inhabited by ticks, you should apply insect repellent to your feet, legs, and arms; wear closed shoes and socks, and wear long pants and a long-sleeved shirt. Always check yourself thoroughly after spending time in such areas, including your scalp and groin. If you find a tick on your skin, remove it completely, making sure that the insect's head comes out.

The Centers for Disease Control and Prevention (CDC) lists 15 different tick-borne diseases on its website ([www.cdc.gov/niosh/topics/tick-borne](http://www.cdc.gov/niosh/topics/tick-borne)). Two of the most concerning tick-borne diseases are:

- **Lyme disease.** *Lyme disease* is caused by infection with the *Borrelia burgdorferi* bacterium and is carried by blacklegged ticks. It is most prevalent in the northeastern United States, the upper Midwest, and the Pacific coast. Characteristic symptoms include a specific type of skin rash accompanied by fever, headache, and a feeling of tiredness. It is important to diagnose Lyme disease promptly and treat it with antibiotics; treatment usually lasts a few weeks. Without treatment, it can spread to the joints, heart, and central nervous system and cause long-term damage, including severe headaches, arthritis, facial palsy, and irregular heartbeat.

- **Babesiosis.** **Babesiosis** is caused by a microscopic parasite, which is carried by the blacklegged tick. This infection occurs mainly in the Northeast and upper Midwest. The parasites attack red blood cells, causing flu-like symptoms and a form of anemia. In people who have a weakened immune system or a serious health issue, are elderly, or do not have a spleen, babesiosis can become severe and even life-threatening. There is no vaccine for babesiosis, but it can be successfully treated.

## Antibiotics and Antibiotic Resistance

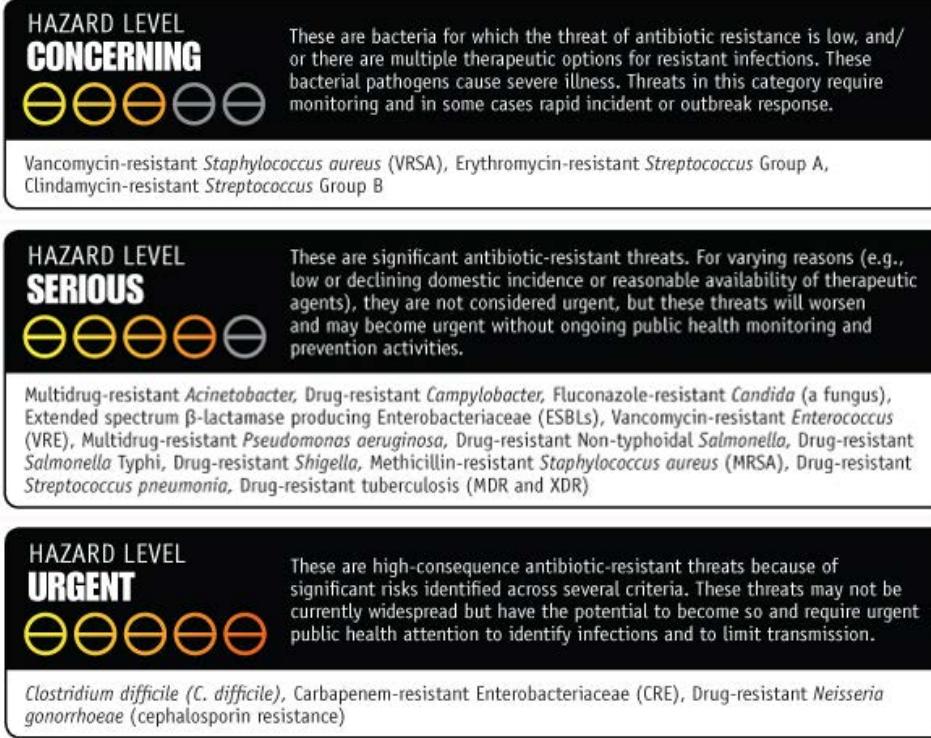
**Antibiotics** are medicines that fight bacterial infections, either by stopping bacteria from reproducing or by killing them outright. Antibiotics belong to a class of products called **antimicrobials**, which are designed to kill bacteria, viruses, or other types of microbes. Some cleaning products also fall into this category because they are formulated to kill bacteria on the skin and other surfaces, such as countertops. However, consumer-grade “anti-bacterial” hand soaps have been shown to be ineffective.

These drugs have been in use for generations, beginning with anti-syphilis compounds marketed during the first decade of the 20th century, and then with penicillin in the 1940s. Today, more than 100 distinct types of antibiotic drugs are available. Many are *broad-spectrum antibiotics*, which are effective against multiple types of bacteria. Conversely, a *narrow-spectrum antibiotic* works against a specific family of bacteria.

Antibiotics are one of the most successful medical treatments ever discovered. They are so successful, in fact, that Americans began taking antibiotics for granted and have long assumed that bacterial infections were no big deal because they could be easily treated with an antibiotic. This led to widespread overprescribing of these drugs, even in cases where they weren’t needed. For example, patients began demanding antibiotics for viral illnesses that don’t even respond to antibiotics, such as influenza and the common cold. Physicians yielded to these requests, thinking that even if the drug wouldn’t do any good, it wouldn’t do any harm either. But this assumption was wrong, and over time bacteria responded by adapting with increased resistance to antibiotics. The more we use antibiotics, the more opportunities bacteria have to adapt and develop resistance to them. As a result, drugs that were once effective at killing these germs or stopping their spread now have little or no impact on them.

Antibiotic resistance is rapidly becoming a serious problem around the world. The World Health Organization describes antimicrobial resistance as “[a] serious threat [that] is no longer a prediction for the future, it is happening right now in every region of the world and has the potential to affect anyone, of any age, in any country.” In 2019 the CDC estimated that 2.8 million Americans become ill due to antibiotic resistance, and more than 35,000 people died. The CDC lists 18 bacteria that are known to be antibiotic-resistant (*Figure 11*). Some of them are resistant to at least one antibiotic, while a few are resistant to a variety of these medications. A few have even developed such a high level of resistance that they are called **superbugs**.

The most well-known superbug is Methicillin-resistant *Staphylococcus aureus* (MRSA), a bacterium that is often transmitted in health care settings. MRSA spreads by contact—for example, by touching an infected wound on another person, or by sharing items that have come into contact with the germ, such as razors. MRSA is resistant to many different antibiotics, making it difficult to treat. MRSA can cause several types of infections, including infections of the skin, ear, and blood, and can play a role in pneumonia and surgical infections.



**Figure 11.** The CDC uses these warnings to announce the threat levels of antibiotic-resistant bacteria.

**Source:** Centers for Disease Control.

When bacteria resist traditional antibiotic treatments, alternative treatments must be found, and they can be expensive and even toxic to the patient. Scientists are constantly working to create new antibiotics and to refine existing ones to overcome resistance. This work is slow and costly, however, so experts encourage Americans to take steps now to slow the development of further resistance among bacteria. Those steps include:

- *Avoid infections in the first place.* The fewer infections you get, the less often you will need antibiotics, and simply taking antibiotics contributes to resistance.
- *Keep your vaccinations up to date.* Check with your health care provider to see if any of your vaccinations have expired or been missed and get them if necessary.
- *Wash your hands often.* Good hygiene has always been a key to avoiding infections. Experts recommend using plain soap and plenty of water. (Antimicrobial soaps have been shown to be ineffective and they contribute to resistance.) Wash your hands for at least 20 seconds, and then rinse thoroughly. Change your towels often so you won't use one that's contaminated (*Figure 12*).
- *Don't take antibiotics if you don't need them.* If your doctor says you don't need an antibiotic, don't insist on getting a prescription. The medication won't help, and you'll be wasting your money.

The CDC also recommends the following guidelines for washing hands the right way:

1. Wet your hands with clean, running water (warm or cold), turn off the tap, and apply soap.
2. Lather your hands by rubbing them together with the soap. Lather the backs of your hands, between your fingers, and under your nails.
3. Scrub your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from beginning to end twice.
4. Rinse your hands well under clean, running water.
5. Dry your hands using a clean towel or air dry them.

When soap and water are not available you can also use a hand sanitizer that is at least 60% alcohol.

# KNOW WHEN TO WASH YOUR HANDS



[www.cdc.gov/handwashing](http://www.cdc.gov/handwashing)

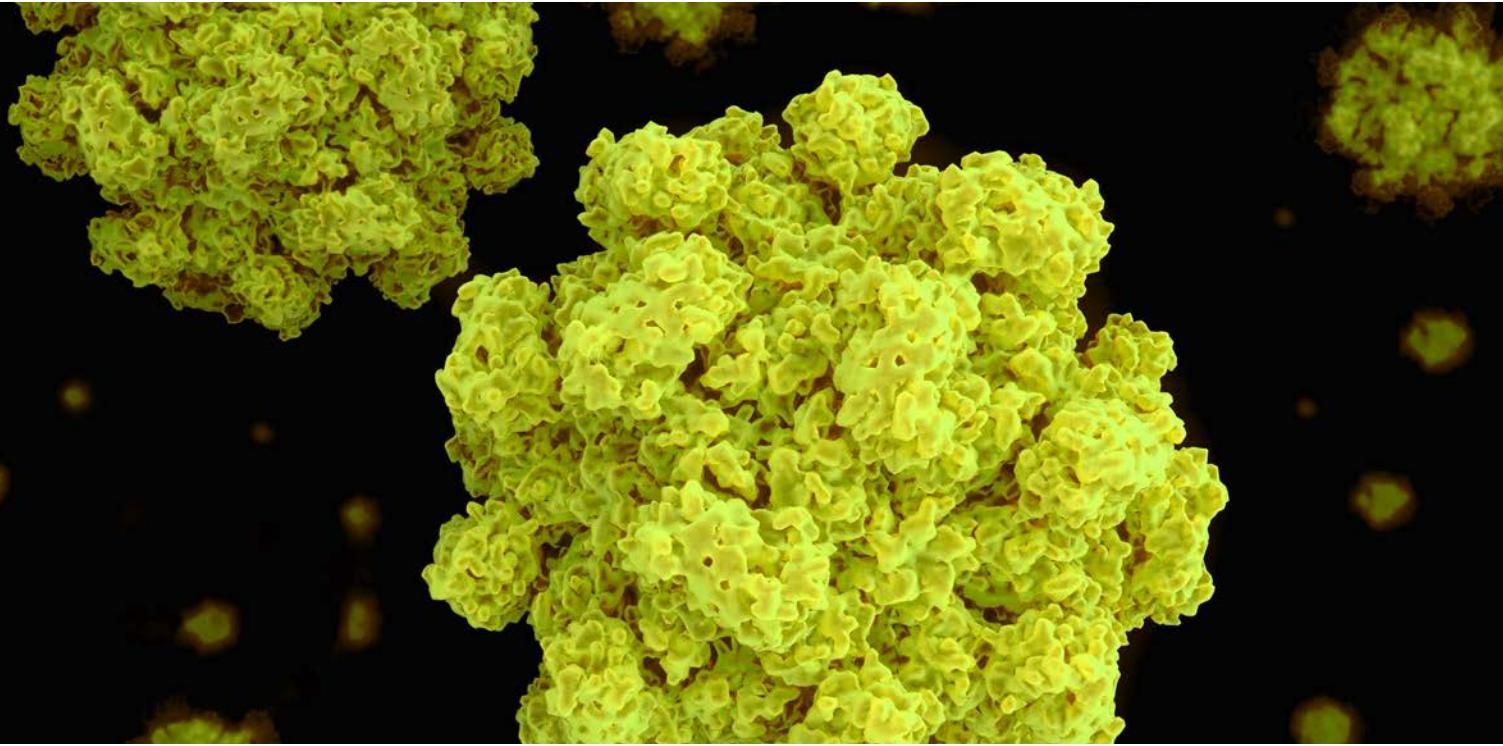


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Figure 12. The CDC provides recommendations for proper hand washing. **Source:** Centers for Disease Control.

# Viruses

A **virus** consists of a single cell that contains genetic material (such DNA or RNA) encased in a tough outer shell (*Figure 13*). Although viruses are often described as microorganisms, they are not alive like other kinds of single-cell organisms. Even so, they are infectious and can invade healthy cells, using them as hosts and replicating themselves by combining their own genetic material with that of the host. Once they take up residence in a host, viruses can replicate very rapidly. Antiviral drugs are effective against certain viruses, but antibiotics are useless against viral infections.



**Figure 13.** A virus is a single cell organism that can invade healthy cells.

Many viruses are airborne, causing infection when inhaled. Others thrive in bodily fluids like saliva, blood, and sexual secretions, and spread through person-to-person contact or from sharing utensils or cups. Some viruses spread through contaminated food or water and are common in areas where sanitation is poor. Viruses can also be spread by insects, particularly mosquitos.

Viral diseases include the common cold, measles, hepatitis, influenza, rabies, herpes, polio, Ebola, Zika, and many others. Sexually transmitted viruses include the human immunodeficiency virus (HIV) and the human papilloma virus (HPV).

## The Common Cold

Lots of people think the common cold is caused by bacteria, but this illness is actually caused by a variety of viruses, most commonly *rhinoviruses*. Rhinoviruses are also associated with sinus and ear infections. Cold viruses can spread through the air when an infected person sneezes or coughs, through close personal contact with a cold sufferer, or from touching an object that is contaminated with an infected person's mucus. So, if you take mercy on someone with a cold and volunteer to pick up the used tissues they have dropped all over the floor, be sure to wash your hands afterward! By the way, you can't catch a cold just by going outside when it's cold. That's a myth. Colds are more common in cold weather and winter months because people are indoors more often making it easier to pass viruses from one person to another.

Cold symptoms usually include a runny nose, sore throat, coughing and/or sneezing, and aches (*Figure 14*). There is no cure for the cold and no vaccine to prevent you from getting one. Also, because colds are viral, antibiotics are not effective against them. A reasonably healthy person will recover from a cold in about a week with no special treatment other than rest, increased fluid intake, and symptom relief. For people with health problems, however, colds can last longer, be more severe, and lead to more serious respiratory illness. It usually isn't necessary to visit a doctor for a common cold, but if your temperature exceeds 100.4 degrees Fahrenheit, or if your symptoms become severe or last more than 10 days, medical attention is in order.



**Figure 14.** It's important to "stay down" when you have cold symptoms because colds are highly contagious.

Because there are so many viruses that cause colds, you can never build up resistance to all of them. This means you'll probably keep getting colds throughout your life, and each one will be caused by a different virus. On average, adult Americans get two or three colds each year, and children catch colds more often.

To reduce your risk of catching a cold, wash your hands frequently; try never to touch your face, nose, or mouth with unwashed hands; and stay away from people who have a cold, if you can. For some time vitamin C supplements have been touted as beneficial for preventing and treating colds. While vitamin C is important for a healthy immune system the data show that vitamin C supplementation is only weakly beneficial for preventing or treating the common cold.

## Influenza

Commonly known as the flu, influenza is caused by a wide variety of viruses and takes many forms. Flu infections are typically more severe and aggravating than the common cold, but most flu sufferers recover in 1 to 2 weeks. Flu symptoms can include a combination of fever, cough, sore throat, runny or stuffy nose, aches, chills, and fatigue. Influenza sometimes brings about diarrhea and/or vomiting.

If you catch the flu, you may be able to use antiviral drugs to treat it, although the CDC recommends antiviral drugs primarily for people who are at high risk for flu complications and people who become very sick. These drugs are available only by prescription, however, and work best if started soon after symptoms appear. If the symptoms are mild, doctors advise that it's best simply to stay home, rest, drink plenty of fluids, and use over-the-counter (OTC) medications to control your symptoms. It usually isn't necessary to see a doctor unless you have trouble breathing, feel pressure or pain in your chest or abdomen, experience dizziness or confusion, or begin vomiting severely or persistently. If any of these symptoms occur, call your doctor or go to an emergency room.

You can avoid catching the flu by taking the same precautions you take against the common cold. In addition, the CDC recommends that everyone, with few exceptions, over 6 months old get a flu shot every year. An annual flu vaccination is needed because flu viruses adapt and evolve very quickly, so last year's flu shot may not protect you against the viruses that are most prevalent this year. Researchers predict which viruses to include in a given year's vaccine by tracking flu outbreaks year-round to determine which strains are likely to be most common in the upcoming flu season. In the United States, flu season usually begins in the fall and ends the following spring, peaking between December and March.

## Hepatitis

**Hepatitis** is a disease that causes inflammation of the liver. It is most often caused by a virus but can also be caused by drug or alcohol use, or when the body's immune system attacks the liver. There are seven distinct varieties (*strains*) of viral hepatitis, named hepatitis A, B, C, D, E, G, and X. Each one is caused by a hepatitis virus named with the same letter: hepatitis A, hepatitis B, etc. Hepatitis X is caused by an as-yet unidentified virus.

An interesting aspect of hepatitis is that different strains of the virus can be transmitted in different ways. Hepatitis A is caused by consuming food or water that is contaminated with the hepatitis A virus, for example, while hepatitis B is an STD that spreads through infected body fluids.

Hepatitis is widespread; worldwide, it is estimated that hundreds of millions of people are infected with some form of hepatitis.

Hepatitis sufferers may have any combination of these symptoms:

- Nausea and/or vomiting
- Diarrhea
- Dark urine
- Pale stools
- Pain in the stomach
- Jaundice (yellowing of the skin and/or the whites of the eyes)

Some people with hepatitis experience no symptoms at all and may not be aware they have the disease. A serious hepatitis infection can lead to cirrhosis (scarring of the liver) or liver cancer. The hepatitis A, B, and C viruses tend to cause the most liver damage, and hepatitis C is a leading cause of liver cancer.

Hepatitis may resolve itself with no treatment or the infection may remain for life. There are treatments for hepatitis, and vaccines can prevent certain types of the disease.

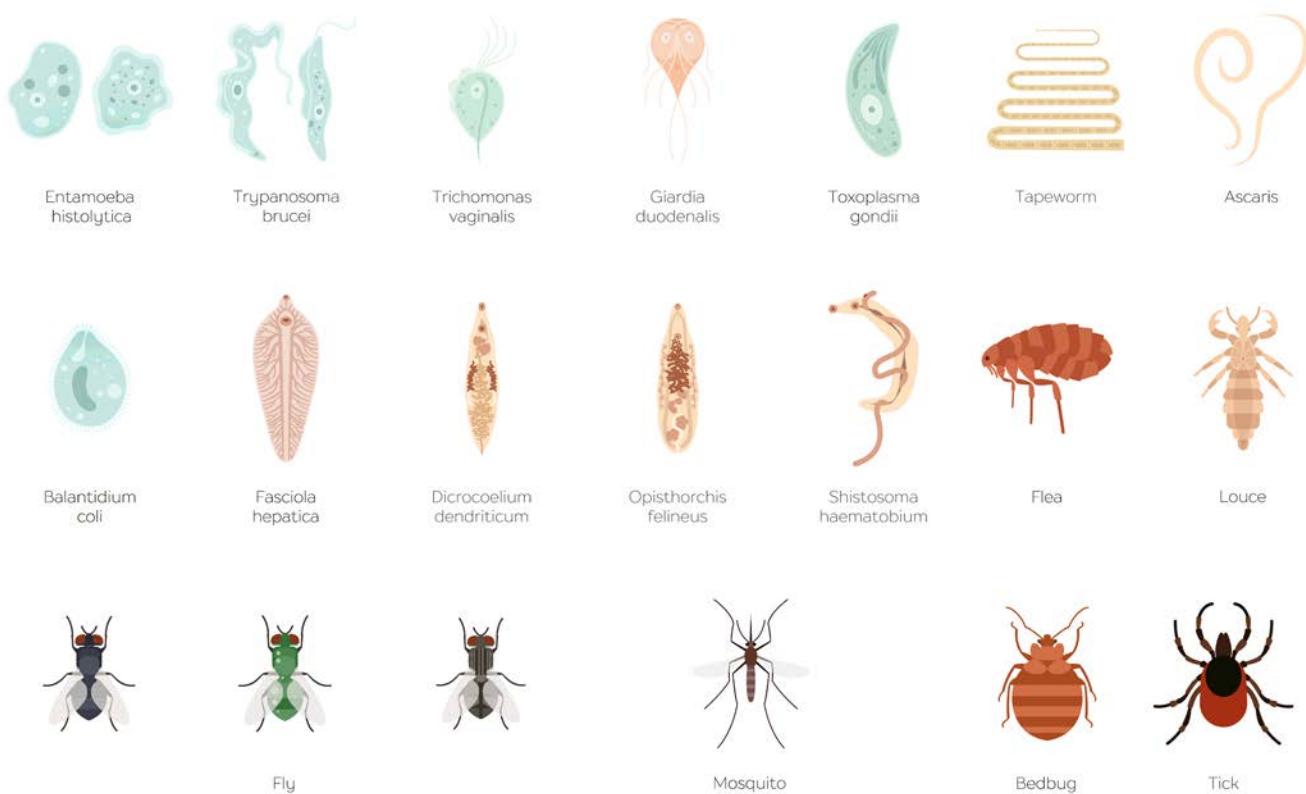
# THE SCIENCE OF THE WHOLE INDIVIDUAL

## The HPV Vaccine

There are multiple types of human papillomavirus. In a recent study on the estimated prevalence and incidence of HPV it was found that in the U.S. the prevalence of HPV of any type is 40 percent among 15–59-year-olds (41.8 percent in men and 38.4 percent in women). There were an estimated 23.4 million men and 19.2 million women infected with HPV in 2018. There were 6.9 and 6.1 million new cases of HPV in men and women respectively in 2018. HPV can cause various types of cancers in both men and women.

An updated version of the Gardasil vaccine protects against infection from nine varieties of HPV and the cancers caused by the viruses.

The 2021 CDC recommendation is for routine HPV vaccination at ages 11 or 12 years and everyone should be vaccinated through age 26 years if not adequately vaccinated when younger. The doses should be given at least 6 months apart. Older children and young adults (age 15–26) should get three doses of the vaccine. HPV vaccine is not recommended for use during pregnancy.



**Figure 15.** A wide variety of parasites can cause infections and disease.

## Parasites

A **parasite** is an organism that requires a host to provide a food source (*Figure 15*). Parasites can be water-borne or carried by animals or insects, but a number of insects—such as lice, fleas, and a variety of worms, such as roundworms—are considered to be parasites in and of themselves. Three types of parasites cause diseases in people:

- *Protozoa* are single-celled microorganisms that cause diseases such as malaria and toxoplasmosis.
- *Helminths* (tiny worms) cause dozens of diseases affecting several different organ systems; trichinosis and swimmer's itch are two common examples.
- *Ectoparasites* don't enter the body but attack the skin and hair follicles. For example, fleas can transmit a variety of diseases through their bites, and lice cause several different skin infections.

The sexually transmitted parasitic disease trichomoniasis is spread by person-to-person contact.

## Fungi

A **fungus** is a simple, primitive organism. Molds, mildews, and mushrooms are forms of fungi. (*Fungi* is the plural of *fungus*.) There are many varieties of fungi and about 50 percent of them are harmful to humans. They are plentiful in the soil and on plants and trees; fungi can also thrive indoors and even on the human skin. Because fungi reproduce by releasing spores into the air, human fungal infections commonly begin on the skin and in the respiratory tract.

Fungi cause a wide range of infections, including allergic reactions, lung infections, athlete's foot, thrush, vaginal yeast infections, jock itch, ringworm, and others (*Figure 16*). As stated previously, there is even a fungal form of meningitis. There are effective treatments for many types of fungal infections.



**Figure 16.** Fungal nail infections can affect the hands and feet and can be very difficult to treat.

## Prions

A **prion** is a protein particle that becomes folded in an abnormal manner. One prion can cause proteins around it to fold abnormally, thereby spreading the condition. These proteins are plentiful in the brain. Prions tend to clump together and are believed to cause a number of degenerative neurological conditions in human and mammals, such as Creutzfeldt-Jakob Disease, Kuru, and Gerstmann-Straussler-Scheinker Syndrome in people, and chronic wasting disease and several forms of encephalopathy (most notably "mad cow disease") in animals. Prion-based diseases progress rapidly and always result in death.

Prion research is relatively new and very little is understood about prions and their behavior. There are currently no effective treatments for these diseases, other than providing support for the infected person and preventing transmission.

## Emerging Diseases

Just when you think medical science has it all figured out, new infectious diseases emerge, nearly forgotten ones re-emerge, or a known disease mutates into something different and more dangerous. Of course the most recent world-wide concern in public health has been the Coronavirus (COVID-19). Since March of 2020 until June 2022 almost 562 million people world-wide have contracted coronavirus resulting in 6.3 million deaths. There are many different kinds of coronavirus. In 2019 a coronavirus, SARS-CoV-2, was identified. This virus caused a pandemic of respiratory illness called COVID-19.

While most infected persons will only experience mild to moderate symptoms, some people become seriously ill and need medical care. Typically the aged and those with underlying health conditions like cardiovascular disease, diabetes, and overweight/obesity are more likely to become seriously ill and are at higher risk of death. When a person has two or more disease processes with unrelated pathologies occurring at the same time the combined effects of the diseases are compounded and risk of serious illness and death is higher than the summed effects of each individual disease. This condition is termed comorbidity or the person is said to be comorbid. There are vaccines for the coronavirus and everyone should discuss their vaccine options with a qualified healthcare practitioner.

THE SCIENCE OF THE WHOLE INDIVIDUAL

## Bioterrorism

The federal government defines *bioterrorism* as "the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants." The infectious agents that might be used in a bioterrorism attack are the same kinds of naturally occurring pathogens described in this chapter. Terrorists are most likely to use pathogens that can be altered to make them more virulent,

more resistant to treatment, or easier to spread. This kind of alteration is sometimes called weaponizing. The CDC has identified about 40 agents and diseases that could be effective agents in a bioterrorism attack. The Department of Homeland Security recommends everyone have an emergency supply kit ready for such a disaster (*Figure 17*).

For information on preparing for a bioterrorism attack and other types of emergencies, visit the Department of Homeland Security's "Ready" site, at [www.ready.gov/Bioterrorism](http://www.ready.gov/Bioterrorism) and the CDC's "Emergency Preparedness and Response" page, at [emergency.cdc.gov](http://emergency.cdc.gov).



**Figure 17.** An emergency supply kit should contain food, water, and any other supplies that may be needed over several days after a disaster.

## Zika Virus

**Zika** is a viral infection that is typically transmitted through mosquito bites (*Figure 18*). Although science has known about Zika for decades, it was largely ignored because it was usually symptomless or mild and did not seem to have any lasting effects. (Only about 1 in 5 persons infected with Zika develop symptoms.) That changed when a 2016 outbreak in South America resulted in babies being born with microcephaly (a serious birth defect of the brain that causes the child's brain and skull to be abnormally small, affecting their development for life) after the virus was passed to them by their mothers during pregnancy. Concern about Zika exploded in the United States the same year when the virus was detected in mosquitos in the southern coastal region. The Zika virus can be detected by a blood test, but there is no vaccine or treatment for it yet. Avoiding Zika requires the same precautions as other insect-borne infections.



**Figure 18.** Zika is spread mostly by the bite of an infected Aedes species mosquito (*Ae. aegypti* and *Ae. albopictus*).

## Measles

For generations, **measles** was thought of as just a common childhood disease, but it is actually serious. A highly contagious viral disease, measles brings on a high fever that can spike above 104 degrees, coughing, runny nose, conjunctivitis (“pink eye”), and a rash. About one-quarter of people infected with measles require hospitalization. The CDC says that one of every 1,000 persons with measles develops *encephalitis* (swelling of the brain) that can lead to brain damage. Further, one or two of every 1,000 measles victims die from the disease or complications from it.

Measles can be prevented starting in early childhood with the measles-mumps-rubella (MMR) vaccine. Previously unvaccinated teenagers and adults are urged to get a measles vaccination because measles can strike at any age. The vaccination is important for anyone who travels outside the United States because the disease is still prevalent in many countries.

Once common in the United States, measles infected three to four million Americans every year before vaccinations came into broad use in the early 1960s. In 2000, the U.S. declared that measles had been eliminated from the country, marking the culmination of public health efforts to eradicate the disease. (“Elimination” means that a disease is not continuously transmitted for 12 months or more in a given geographic area.)

Since then, measles cases were rare until 2008, when several localized outbreaks occurred in areas with groups of unvaccinated people. In 2013, measles cases increased again, with 11 outbreaks. There were 23 outbreaks in 2014, including a large single outbreak among nearly 400 people, many of whom had not been vaccinated due to religious objections. In 2015, a multiple-state outbreak started when about 40 people were exposed to measles at an amusement park in California. Experts attribute these outbreaks to two factors:

- The measles had likely been brought into the United States by travelers who had been exposed in other countries.
- Unvaccinated people accounted for most of the cases and most of the transmission.

The 2015 outbreak was so serious that it spurred new efforts to convince unvaccinated people to get vaccinated and a special push to convince parents to get the measles vaccine for their children. Many parents refuse vaccines out of fear that the drugs cause autism and other developmental problems in children; this fear remains strong even though it has been supported by scientific research. Some states responded to the outbreak by strengthening their vaccination regulations, making it more difficult to get a vaccination waiver due to religious objections or concerns about vaccine-related complications. In 2021 there were 49 measles cases reported. The largest outbreak since 1992 was reported in 2019 with 1,282 confirmed cases.

## Ebola

Although only a few **Ebola** cases have been reported in the United States (and all of those were in people who had traveled to Ebola-prone parts of Africa), its arrival grabbed headlines and raised concerns about the United States' ability to deal with a new, rapid-spreading, and deadly disease.

The Ebola virus spreads through contact with the bodily fluids of someone who has the disease, or the body of a person who has died from it. A devastating condition, Ebola causes severe headaches, abdominal and muscle pain, high fever, weakness, diarrhea and vomiting, and unexplained bleeding that can be severe. Tests can confirm an Ebola infection but are only accurate after symptoms have set in. After that, supportive therapy is the only available treatment, to keep the person hydrated; reduce fever, diarrhea, and vomiting; and prevent transmission. In the Ebola epidemic of 2014 in West Africa, more than 28,500 cases of the disease were suspected, 15,000 were confirmed, and 11,300 people died from the infection.

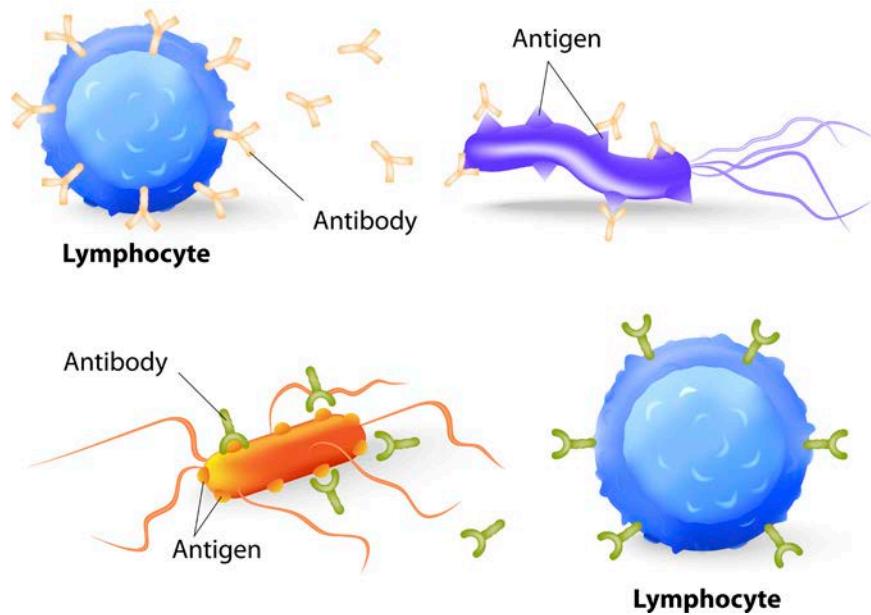
# YOUR DEFENSE: A STRONG IMMUNE SYSTEM

The human immune system is a complex network of specialized structures and cells that protect the body from infectious microorganisms and other invaders, such as pollen and even cancer. The immune system does this without attacking your body's own cells. It can differentiate your own cells ("self") from those that don't belong inside you ("non-self").

## Antigens: The Key to the Immune Response

Every cell in your body has molecular markers on its surface, which identify it as one of your own. Your immune system recognizes your cells as "self" (or as not "non-self") and ignores them. Invading organisms also have markers on their surface, but their markers are different from your own, and this enables the immune system to recognize them as "non-self." The markers carried by invading organisms—called **antigens**—trigger the immune response; that is, when the immune system identifies antigens, it responds to prevent them from infecting healthy cells and spreading throughout your body (*Figure 19*).

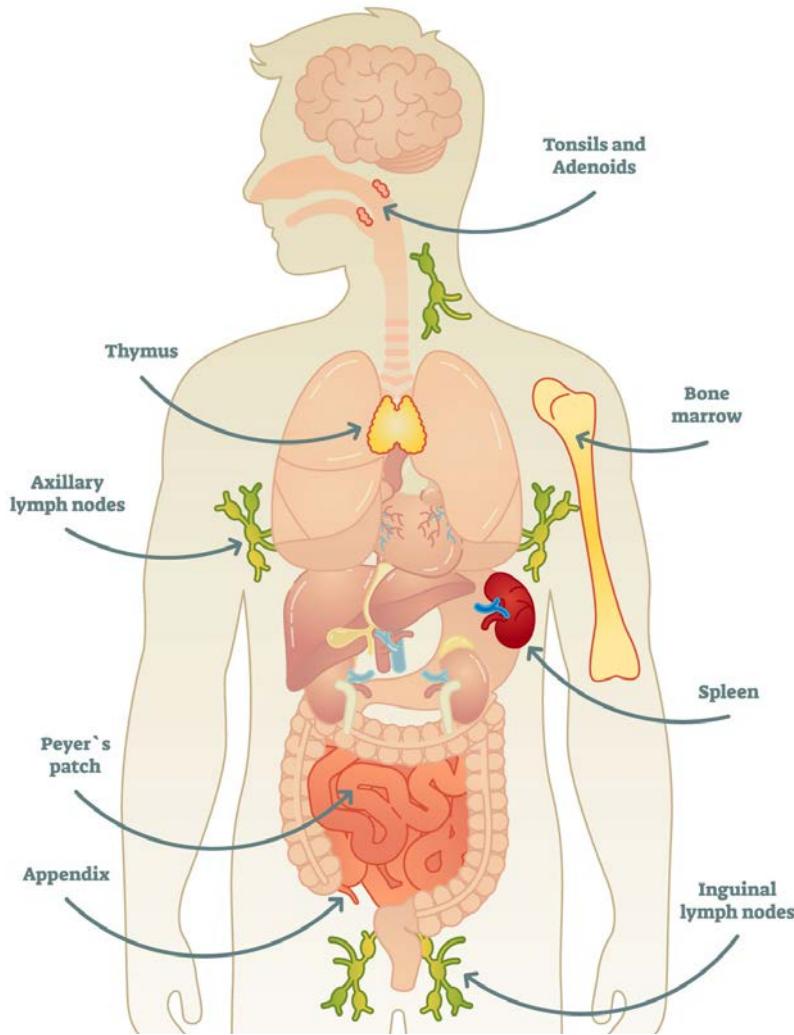
When fighting off a pathogen for the first time, your immune system modifies some of its own cells to work against that specific organism. These new immune cells are **antibodies** and, once created, are stored in your body permanently, so they are always available to respond if that organism strikes again.



**Figure 19.** Antigens are markers on invading organisms that trigger the immune system.

## The Parts of the Immune System

The immune system includes a variety of components. Each one plays a specific role in fighting infections (**Figure 20**).



**Figure 20.** Each part of the human immune system plays a specific role in fighting off infection.

The spleen, the thymus, and bone marrow are called lymphoid organs because they are involved in producing or storing special cells, called **leukocytes**, which are your body's first line of defense in fighting off antigens. Leukocytes are specialized blood cells, commonly known as *white blood cells*, that find and destroy antigens. Leukocytes reside in structures called lymph nodes (or lymph glands).

Leukocytes fall into two types. The first are called *phagocytes*, which "eat" pathogens to rid them from the body. The second type—the *lymphocytes*—are programmed to recognize and kill pathogens that have infected the body before, so the immune system can mount specific defenses against them in the future.

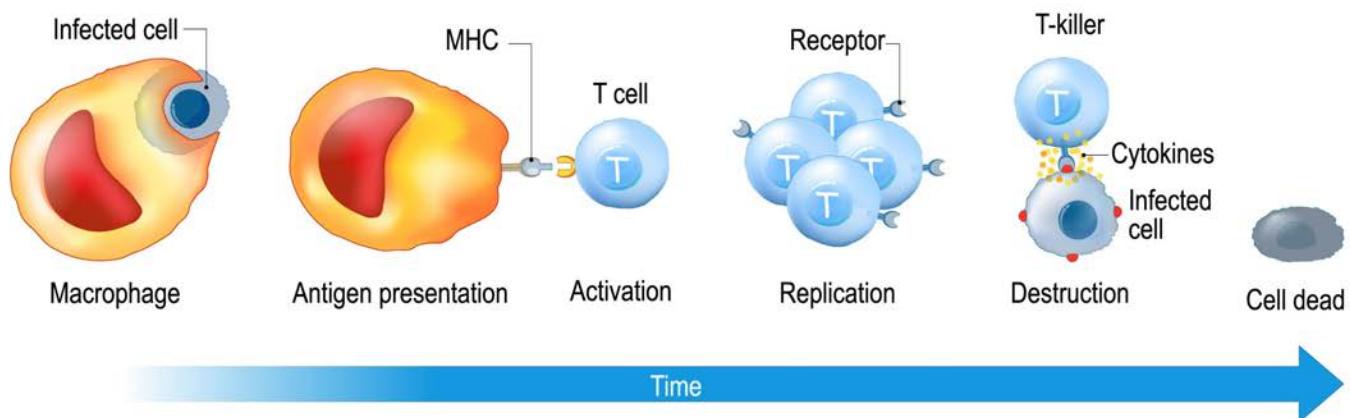
Phagocytes are the "brute force" element of the immune system. They ingest not only infectious agents such as bacteria, but your own cells that have become infected, as well as dead or dying cells. (In fact, the name *phagocyte* comes from the Greek *phagein*, which means "to eat.") Many phagocytes have receptors on their surface that recognize harmful particles in the body. After recognizing a foreign particle, the receptors attach to it, and the phagocyte consumes the invader. After that, the phagocyte "presents" key parts of the invading cell to other immune cells, so they can more easily find and fight the infection.

As described in the next section, lymphocytes are more strategic in their work. They fall into two categories of their own: *B lymphocytes* and *T lymphocytes*. T lymphocytes come in two varieties, called *helper T cells* and *killer T cells*. Taken together, the actions of these cells are called the immune response.

## The Immune Response

Imagine having a simple injury, such as a scratch on the back of your hand that becomes infected. When the wound is exposed to bacteria, the infection process begins as the pathogen takes up residence in the surrounding cells and starts multiplying. The wounded area displays the typical symptoms of inflammation: swelling, redness, warmth, and pain. If the infection becomes serious enough, you may even develop a fever and the wound may start oozing.

The symptoms of inflammation are more than just signs of infection; they also tell you that your immune system has taken action and the immune response is underway. The inflammation is triggered by chemicals from the damaged cells themselves, which call immune cells to the site to fight the invading pathogens. Swelling and redness tell you that blood flow to the area has increased to nourish the damaged tissue, carry immune cells to the area, and to carry away dead and damaged cells.



**Figure 21.** The immune response begins working as soon as a foreign organism enters the body.

In basic terms, here's how the immune response works (*Figure 21*).

1. An organism—in this case, bacteria—enters the body and is recognizable by the antigens on its surface.
2. Phagocytes start consuming the invader and present its material to other immune cells.
3. A specialized type of T lymphocyte, called a *helper T cell*, releases chemicals that trigger the action of B lymphocytes, which begin producing antibodies against the organism's antigen (based on its shape) and neutralizes it.
4. The helper T cells also encourage the development of killer T cells, which destroy cells infected by the pathogen. Meanwhile, more phagocytes attack the area and kill pathogens and body cells that have been infected.
5. This action also gives rise to memory T cells, which help the body respond more rapidly to future infections by the same pathogen.

## Types of Immunity

Immunity takes three forms, and you carry all of them:

- **Innate immunity.** This is the immunity you are born with. At birth, your body harbors antibodies and other natural defenses (such as the protective membranes that surround your cells) that prevent you from infection by a large number of pathogens.
- **Adaptive immunity.** This is the type of immunity conferred by the immune response. When your body fights off a pathogen for the first time, it adapts so that it is able to fight the pathogen again.
- **Passive immunity.** This is immunity that you get from an external source. For example, vaccinations give your body the ability to fight specific types of infections. This kind of immunity is said to be "borrowed."

Different parts of your body have specific defenses built into them to provide some degree of protection from pathogens. For example, your mucous membranes produce a sticky fluid that traps foreign particles and pathogens and carries them away, preventing them from infecting your respiratory system. Your skin is a defensive barrier that includes its own immune cells and can heal itself fairly quickly to protect against infection. Even your tears carry antibodies that protect the surface of your eyes from infection.

## Autoimmune Diseases

As you have read, the immune system is designed to attack invading pathogens and protect you from infections and diseases. Sometimes, however, the immune system targets healthy cells in the body. This type of condition is called ***autoimmune disease***, and it comes in several varieties.

According to the National Institutes of Health (NIH), there are more than 80 known types of autoimmune diseases, and they affect many different parts of the body. Many have similar symptoms and may be present for a long time before symptoms appear, making them difficult to diagnose. Early symptoms usually include fatigue, aching muscles, and fever. Inflammation is characteristic of many autoimmune diseases. Autoimmune diseases tend to go through phases where symptoms gain in severity and then get better. Women tend to suffer from autoimmune diseases more than men.

Experts aren't sure what causes autoimmune diseases, and treatment typically focuses on symptom relief and reducing inflammation. A few well-known autoimmune diseases are celiac disease, diabetes type 1, Guillain-Barre syndrome, and inflammatory bowel disease.

# KEEP YOUR IMMUNE SYSTEM STRONG

Because of its adaptability, and the fact that it is tailored to your specific body, your immune system is your most important defense against infections. But for your body to protect itself optimally, you need to take care of yourself and practice healthy behaviors that boost your immune system and keep it functioning properly. These behaviors run across many of the dimensions of well-being.

- **Physical activity.** Consistent physical activity is important for every aspect of your health, not just your immune system. But exercise reduces your chances of infection by boosting your overall health, making your body more resilient in general. No one knows the exact mechanism by which exercise affects immunity, but there are theories that activity helps remove microbes from the lungs and airways and promotes the free circulation of antibodies through the body. Leukocytosis—an increase in white blood cells—following acute exercise was first reported over a century ago. Neutrophils—a type of white blood cell—are also highly responsive to acute exercise. Monocytes—a large circulating blood cell—have also been shown to increase in response to different types of exercise, such as endurance training, short-bout high-intensity exercise, and resistance training.
- **Healthy diet.** You can't watch TV or go online without seeing something mentioned about "probiotics," "gut bacteria," and "immunity-enhancing vitamins." While the jury is still out on some of these products and their claims, it is known that a healthy diet is good for immunity. This is because certain nutrients boost the immune system and keep you healthier in general. However, another link exists between diet and infection: food safety. Always handle foods in a safe manner when storing and preparing them. Doing so will reduce your risk of food-borne infections.
- **Stress reduction and management.** Stress has been shown to weaken the immune system, especially chronic (prolonged) stress. If you frequently feel anxious or stressed, find ways to reduce and manage it. Physical activity is an easy and effective way to release stress, as are practices such as meditation, focused breathing, yoga, and others.
- **Sleep.** Overall, your entire body needs consistent sound sleep (7–8 hours per night for most young adults) to function at its best. This includes your immune system. Sleep deprivation can make the body more susceptible to infections such as colds and flu, which can lead to more severe respiratory infections.
- **Working with your healthcare provider.** If you frequently suffer infections or get sick a lot, you should talk to your health care provider about underlying issues that could make you susceptible. Stress and lack of sleep are two important factors to talk about, but your doctor will probably ask you about other habits as well and can offer advice to help improve your health and boost your immunity. You may also need to catch up on your vaccinations, as well.

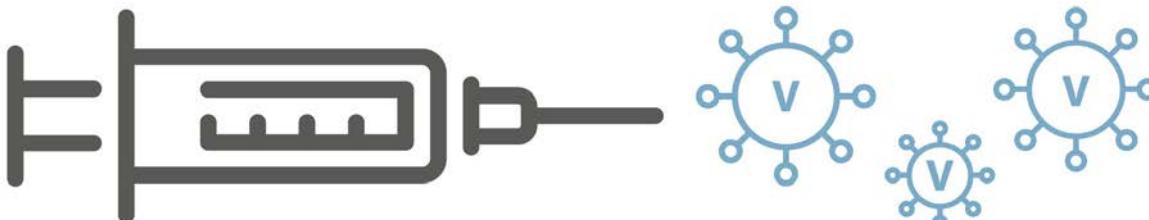
## The Importance of Vaccines

As discussed throughout this chapter, vaccines are important tools to prevent infections. A **vaccine** is a serum that boosts the immune system and prevents diseases caused by infection from certain microorganisms. When the majority of people in a community are vaccinated, the result is herd immunity, which helps protect everyone from infections and can even help protect those who can't (or won't) be vaccinated for one reason or another.

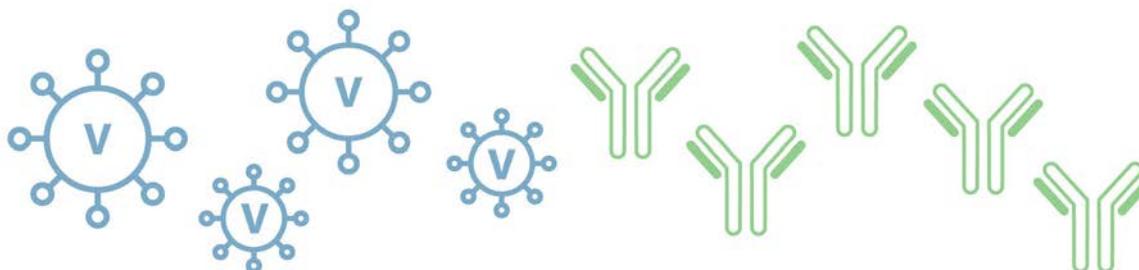
Vaccines work by exposing your body to a small amount of an infectious microbe (such as a virus) that has been weakened or killed (*Figure 22*). The body responds to the microbe and develops immunity against it, “learning” to fight the pathogen without actually being sickened by it.

## HOW DO VACCINES WORK?

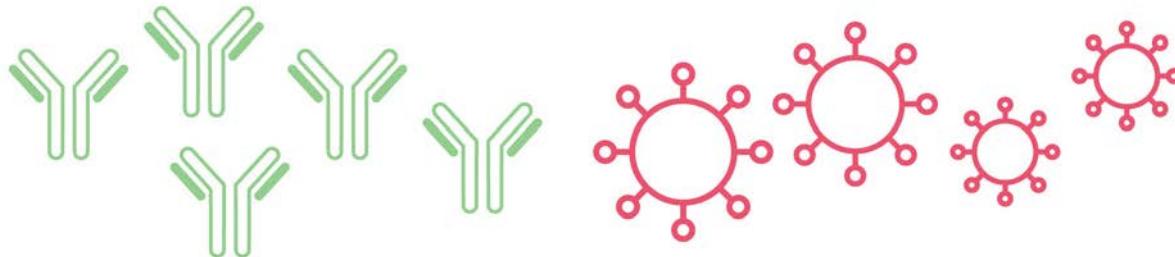
Vaccines are like a training course for the immune system. They prepare the body to fight disease by working with the body’s natural defense system and without exposing the body to disease symptoms.



A VACCINE (weakened or killed form of the disease) is injected into the body.



The body creates ANTIBODIES to fight the germs.



If the actual disease GERMS ever attack the body,  
the antibodies return to destroy them.

**Figure 22.** A vaccine works by introducing a weakened or killed virus into the body, allowing the immune system to create antibodies to work against it.

## Vaccination Benefits Outweigh the Risks

Vaccines can cause some side effects, such as swelling and redness where the vaccination shot was given. These side effects are almost always minor. In rare occasions, a vaccination can cause a severe allergic reaction. Medical personnel are trained to deal with these situations. The benefit of preventing painful, debilitating disease is much greater than the risks that may come with vaccinations.

## Consult with Your Doctor First

There are certain factors, such as age or health condition, that should be considered before getting a vaccination. Let your doctor know if you have serious health allergies or serious medical conditions. The CDC’s Vaccines and Immunizations website ([www.cdc.gov/vaccines](http://www.cdc.gov/vaccines)) offers information about who should not get specific vaccines.

## Be Informed about Vaccines

A significant number of Americans refuse to be vaccinated or—even worse—refuse to allow their children to be vaccinated, even though many states and cities have laws mandating specific vaccinations for children of certain ages. Some people refuse vaccinations because of deeply held religious objections; others should not receive certain vaccines due to legitimate health issues (such as allergies or certain illnesses). However, many widely held objections continue to persist even though they have been disproven by years of use and research.

For example, the belief persists that some vaccines cause autism (a developmental disability) in children. This belief has never been proved, and experts say that studies show there is no link between vaccines and autism. This does not mean that a single case of autism related to a vaccine has not occurred, but from a population perspective a correlation has not been shown.

Concerns about vaccine safety is another big issue, especially among parents who fear vaccines can make their children sick, especially if they contain certain ingredients such as thimerosal, but either no link has been established between those ingredients and illness, or they have been removed from the vaccine supply altogether.

Responding to objections over vaccinations, medical experts universally advise that the benefits of vaccinations far outweigh any risks that they might pose. If you have any concern about any vaccination for yourself or your child, ask your health care provider for advice. He or she can give you the full truth about vaccines and put to rest any fears you may have.

## Vaccines and College Students

Most vaccines are given in childhood and early in the teenage years, but college students need (or may need) additional vaccinations to protect them at school. These include:

- *Meningococcal conjugate vaccine* to prevent bacterial meningitis. The meningitis vaccine may be given in two doses.
- *Tdap vaccine* to prevent tetanus, diphtheria, and pertussis (whooping cough).
- *HPV vaccine* to prevent infection by the human papilloma virus and the cancers it can cause.
- *Seasonal flu vaccine*, taken annually, to prevent infection by the most prevalent flu viruses during the upcoming flu season.

It's important to note that the vaccination requirements for teens and young adults vary by state and may vary from school to school. Some colleges may require proof of vaccination before enrollment.

## MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Explain how pathogens infect people and describe behaviors you can practice that will prevent you and others from becoming infected.
2. Know what infectious diseases you are most at risk for given your current circumstances and do the things that you have learned about to reduce your risk of infection.
3. Be familiar with vaccine guidelines and recommendations so that you can make the best decisions for yourself.
4. Know what you can do to strengthen and maintain a healthy immune system.

# SUGGESTED READING

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# GLOSSARY TERMS

**Antibiotics:** Medicines that fight bacterial infections.

**Antibodies:** Cells modified by the immune system to work against a specific organism.

**Antigens:** Markers carried by invading organisms.

**Antimicrobials:** A class of products that are designed to kill bacteria, viruses, or other types of microbes.

**Autoimmune disease:** A condition in which the immune system targets healthy cells in the body.

**Babesiosis:** A disease caused by a microscopic parasite, which is carried by the blacklegged tick.

**Bacteria:** Single-cell microorganisms that can live almost anywhere.

**Chain of Infection:** An epidemiology model that describes the process of infection.

**Comorbidity:** The existence of more than one disease condition occurring simultaneously in an individual.

**Ebola:** A devastating condition that causes severe headaches, abdominal and muscle pain, high fever, weakness, diarrhea and vomiting, and unexplained bleeding.

**Epidemic:** The spread of infectious disease that affects many people in a given geographic area.

**Epidemiologic Triangle:** A model that describes players in an infection—the agent, the host, and the environment.

**Epidemiology:** The study of disease prevalence and transmission.

**Fungus:** A simple, primitive organism that is plentiful in the soil and on plants and trees but can also thrive on the human skin.

**Hepatitis:** A disease that causes inflammation of the liver.

**Infection:** An infection occurs when a pathogen takes up residence in the body.

**Infectious disease:** Infectious disease occurs when the body is invaded by a pathogen, which is a microscopic organism—a microorganism—that causes a disease.

**Leukocytes:** Specialized blood cells, commonly known as white blood cells, that find and destroy antigens.

**Lyme disease:** A disease caused by infection with the *Borrelia burgdorferi* bacterium and is carried by blacklegged ticks.

**Measles:** A highly contagious viral disease that can bring on high fever, coughing, runny nose, conjunctivitis, and rash.

**Meningitis:** An infection that causes swelling and inflammation of the membranes (the meninges) that surround the brain and spinal cord.

**Microorganism:** An organism too small to see with the naked eye. Bacteria, algae, and protozoa are examples of microorganisms.

**Mode of transmission:** The method by which a pathogen moves from host to host.

**Parasite:** An organism that requires a host to provide a food source.

**Pathogen:** A microorganism that causes a disease.

**Pneumonia:** An infection of the lungs that affects people of all ages.

**Portal of entry:** The location on a host where a pathogen enters the host.

**Portal of exit:** The location on the host where a pathogen leaves to move to another host.

**Prion:** A protein particle that becomes folded in an abnormal manner.

**Reservoir:** A person, animal, plant, soil, or substance in which an infectious agent lives.

**Superbugs:** Bacteria that have become resistant to antibiotics.

**Tick:** An insect that feeds by climbing onto a warm-blooded animal, burying its head under the host's skin, and feeding on the host's blood.

**Tuberculosis (TB):** A bacterial disease that most often affects the lungs but can affect other parts of the body.

**Vaccine:** A serum that boosts the immune system and prevents diseases caused by infection from certain microorganisms.

**Vector:** Any kind of intermediary that can transfer an infectious agent to a host.

**Virulence:** The ability of a pathogen to spread and cause disease.

**Zika:** A viral infection that is typically transmitted through mosquito bites.

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Promote Your Sexual Health

# **How Do I Stay Sexually Healthy?**

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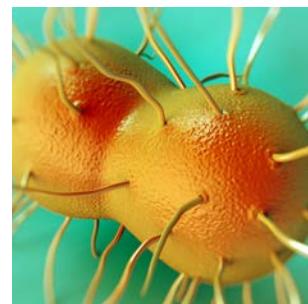
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Sex and sexuality are personal and private parts of who you are. Sex is more than a physical act; it involves the whole you. Sexual relations represent some of our most deeply held values and beliefs. If not treated with care and respect, sexual relations can take us to a place of health difficulty that we do not anticipate. If we did, we would not purposely get ourselves into such a predicament. This chapter emphasizes your rights and responsibilities in the sexual component of your life.



## After reading this chapter, you will be able to:

- › **DISTINGUISH** differences in sexual identity.
- › **DEFINE** sexuality and list your sexual rights and responsibilities.
- › **IDENTIFY** the risks and consequences of unplanned pregnancy.
- › **DESCRIBE** the nature of bacterial and viral STDs.
- › **EXPLAIN** the health-related consequences of abortion.
- › **LIST** ways in which to reduce the risk of sexual harassment, assault, and abuse to you and others.
- › **DESCRIBE** sexual dysfunctions and where to get help.



# How Do I Stay Sexually Healthy?

promote your sexual health

Barbara Lockhart, EdD , and Kandice J. Porter, PhD

Sexual health is more than just physical health. Sexual health is multidimensional and includes our values, our sense of self, our self-image, and the quality of our relationships. According to the World Health Organization, sexual health is

**"a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction, or infirmity."**

Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination, and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected, and fulfilled.

## DEFINE YOUR SEXUALITY

Discussions of how to stay sexually healthy cannot begin without first examining *sexuality*. Sexuality underlies important behaviors that promote sexual health. Sexuality is central to who you are, and it encompasses gender, gender identities and roles, and sexual identity. It includes the physical act of sex and reproduction, but also feelings of intimacy, pleasure, eroticism, and fantasy. Sexuality is not just physical. It is expressed in values, perceptions, beliefs, attitudes, desires, and fantasies. It influences our practices, roles, and relationships. While sexuality can embody all these things, there are biological, mental, cultural, political, economic, legal, and religious factors that can promote or inhibit sexuality.

# Sexuality Is Shaped by You

Sexuality is not just about sexual activity, although many people talk about sexuality in terms of body parts, what we do with these parts, and who we do it with. All of us are sexual beings regardless of whether we are currently sexually active. In fact, we are sexual beings from the moment we are born to the day we die. Our sexuality is shaped by many things, including our values and beliefs, attitudes, personal experiences, physical attributes, sexual characteristics, and societal expectations (*Figure 1*).



**Figure 1.** Your sexuality is experienced and expressed through all dimensions of you—your thoughts, desires, beliefs, attitudes, values, behaviors, and practices.

## Sexual Orientation

Sexuality is a rich and complex area of our human experience. Our sexuality seems to be formed by the time we reach our teenage years. However, it may be many years later before we come to understand and accept our sexuality. Rarely does sexuality fall into distinct categories or lend itself to simple labels. Neither sexual identity nor love can be completely defined, although we do often assign labels to help give a general idea of our preferences—for example, those used by the LGBTQ community:

- Lesbian
- Gay
- Bisexual
- Transexual
- Questioning

Our current society has placed much importance on our sexual identity, both celebrating and fighting for the rights of the LGBTQ community (*Figure 2*). The most important thing we can all do is create a supportive environment in which everyone can find well-being in their identity and their relationships.

There are numerous theories on why an individual's sexuality differs, such as genetic predetermination, in-utero hormone exposure, childhood influences, and peer pressure. However, attempts to find a single cause for an individual's sexuality and sexual orientation have not been successful. The general consensus is that our sexual orientation is simply part of who we are—it is not something we choose.



*Figure 2.* It is important to create a supportive environment for all sexual identities.

## YOUR SEXUAL RIGHTS AND RESPONSIBILITIES

To maintain our sexual health, we must understand our sexual rights and responsibilities. Underlying your sexual rights is your responsibility to maintain your sexual health and to communicate effectively with others. Talk openly and honestly with sexual partners and health care providers. Assert yourself when you feel your sexual rights are being violated. Take an equal role in the prevention of unwanted pregnancy and sexually transmitted infections (STIs). Reject sexual stereotypes that promote misunderstandings and violate the sexual rights of others.

### The Right to Choose to Be Sexually Active or Not

You have the right to make your own decision about whether you want to engage in sexual activity, regardless of a partner's wishes. This includes the right to decide not to be sexually active with someone you have been sexual with before.

### The Right to Make Your Own Decisions about Contraception and Protection

You have the right to make your own decisions about contraception and protection from STIs. You have the right to tell a partner that you will not engage in sexual activity without contraception and/or protection from STIs (*Figure 3*).



**Figure 3.** No one can tell you what you should do with your body.

## The Right to Say No

You have the right to stop sexual activity at any time. You can decide what you are comfortable with sexually and to engage in only those activities you want to do.

## The Right to Ask about Your Partner's Sexual Health

You have the right to ask a partner if she or he has been examined for STIs. However, just because someone has been examined or tested for an STI does not mean he or she is not infected. To be safe, you should use protection every time you engage in sexual activity until both you and your partner have been tested and then retested after six months. Of course, the follow-up test will only be accurate if both partners have remained monogamous during the six months between the two tests.

## The Right to Say What You Want Sexually

You have the right to tell a partner what you would like sexually. This means you also have the responsibility to talk with your partner about your wants and needs. No one can read your mind and no two people like the same thing.

## The Right to Masturbate

Among 20–24 year olds, 83 percent of men and 64 percent of women report masturbating in the past year, which increases to 84 percent of men and 72 percent of women by the ages 25–30 years old. The frequency of masturbation appears to increase with education. Those with a college degree or graduate education masturbate the most often and they also report the most pleasure while doing so.

## The Right to Be Safe

You have the right to sexual autonomy, sexual integrity, and safety of your sexual body. You have the right to make decisions about your sexual health according to your own values, beliefs, and morals.

## The Right to Privacy

You have the right to sexual privacy. Your sexual history and preferences are your personal business. You have the right to expect that health care providers, partners, friends, and peers will not share information about your sexuality.

## The Right to Sexual Equity

You have the right not to be discriminated against based on gender, sexual orientation, age, race, social class, religion, or physical or emotional disability.

## The Right to Sexual Pleasure

Sexual activity is not something of which we should feel ashamed. It is a natural part of being human. Enjoying your sexual experiences is a good thing! If you are engaging in sexual activities that you do not find pleasurable, it may be time to think about your choices.

Are you ready to be sexually active? Is this the right partner for you? Do you need to speak with a health care provider? There is more information at the end of the chapter for individuals who suspect they may be experiencing a sexual disorder or dysfunction.

## The Right to Freedom of Opinion and Expression

You have the right to express your sexuality in any way you choose, as long as it does not violate the sexual rights of others.

## The Right to Information and Education

Learning about sexuality assists us in making safer sexual choices and fosters the development of good relationships throughout our lives. It is important that you know where to find good information with which you can make decisions (*Figure 4*). Advocates for Youth ([www.advocatesforyouth.org](http://www.advocatesforyouth.org)) is an organization that provides credible sexual health information, resources, and services for young people. Your college campus also likely has facilities where you can get such information. You can also get such information from The Ohio State University Health Services, which is discussed throughout this chapter.



**Figure 4.** Know where you can find information about making safe sexual choices.

## The Right to Sexual Health Care

You have the right to be treated for any sexual problems and to get health services to maintain your sexual health. In many places, young people under the age of 18 may obtain confidential health services to prevent pregnancy or treat an STI without parental consent.

THE SCIENCE OF THE WHOLE INDIVIDUAL

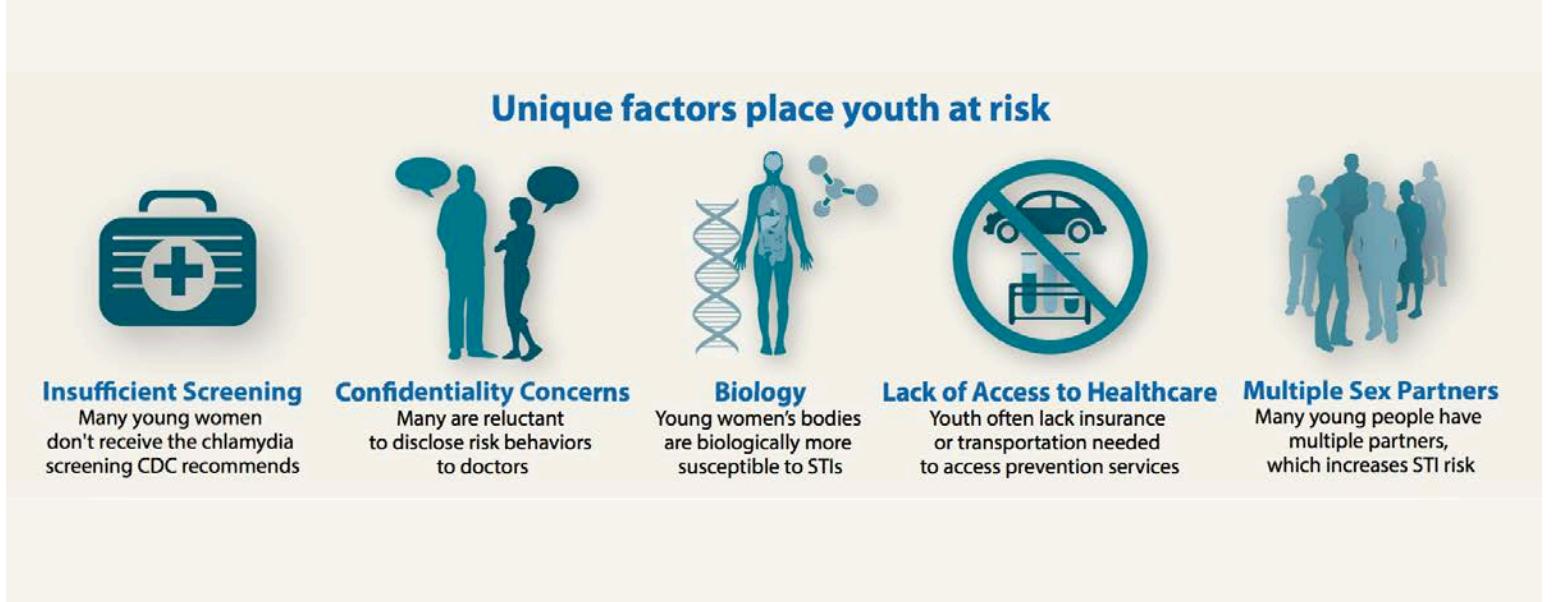
## Critical Thinking Question

Students often remark that it is easier to be sexually active than talk about sexual activity. Why do you think that is the case? How does this mentality contribute to high rates of unplanned pregnancy, STI transmission, and sexual assault in the United States? How can your school assist students in improving their communication skills in regard to sexual health?



## AVOIDING RISKY SEX

The decision to be sexually active is a highly personal choice. You may get the impression from the media or talk between classmates that all college students are having sex and putting themselves at risk. However, data from the National College Health Assessment (NCHA) provides a clearer picture of what college students are doing. How do you think OSU students compare to college students across the nation? Are you aware of the factors that put your sexual health at risk (*Figure 5*)?



**Figure 5.** Be aware of the factors that put you at risk and be proactive about protecting your sexual health.  
**Source:** U.S. Department of Health and Human Services, Center for Disease Control and Prevention.

According to the National College Health Assessment Institutional Data Report for Spring 2014:

- **71.7 percent** of OSU students reported having sexual partners (oral sex, vaginal or anal intercourse) within the last 12 months
- OSU students had an **average of 2** sexual partners in the past year.
- **46 percent** of OSU students have had oral sex in the past 30 days.
- **50 percent** of OSU students have had vaginal sex in the past 30 days.
- **5.2 percent** of OSU students reported having anal sex in the past 30 days.
- **57.9 percent** of current sexually active OSU students used a contraceptive method during vaginal intercourse.
- **9.5 percent** of sexually active OSU students reported using (or report their partner used) emergency contraception within the last 12 months
- **0.9 percent** of OSU students who had vaginal intercourse within the last 12 months reported experiencing an unintended pregnancy or got someone pregnant within the last 12 months

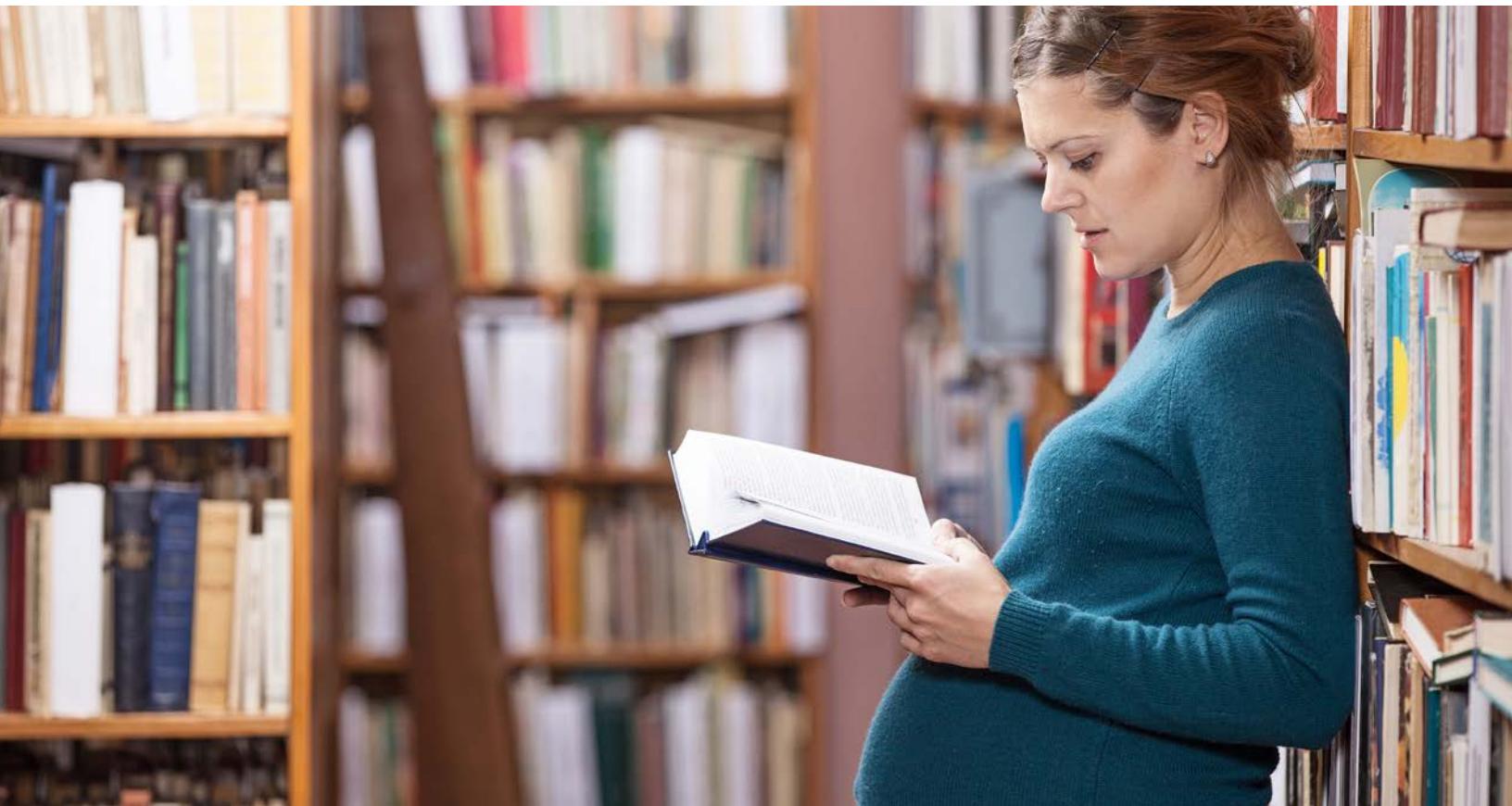
Compared to the national sample of 79,266 college students, OSU students were less likely to have had a sexual partner in the previous 12 months and less likely to have engaged in oral, vaginal and anal sex in the past 30 days. OSU students reported fewer sexual partners in the previous twelve months (average 1.38 partners at OSU versus 2.07 nationwide). OSU students who are sexually active reported higher usage of contraception methods (57.9). The rate of unintentional pregnancy among OSU students was 0.9%, slightly less than the national average (1.2%).

## Unplanned Pregnancy

Since its peak in the early 1990s, teen pregnancy in the United States is at a historic low. However, pregnancy among older teens ages 18–19 and unmarried young adults (20 to 24 years of age) remains high. Eighty-six percent of pregnancies among unmarried women in their twenties are unplanned and occur to women of all races, educational stages, and income levels. Women in their twenties account for 57 percent of abortions in the U.S. and they have the highest abortion rate of any age group.

## The Consequences of Unplanned Pregnancy

Statistics regarding unintended pregnancy should be of great interest to those on college campuses. Unplanned pregnancy may have the potential to delay or derail an OSU student's education. Dealing with an unplanned pregnancy or the responsibilities of being a parent can increase the emotional and financial stress which can undermine academic success. Parents of dependent children make up nearly one-quarter (3.9 million) of the undergraduate students in the United States, and half of those parents are single parents. These students, particularly those who are single parents, often do not do as well in college as their peers without children (*Figure 6*).



**Figure 6.** Unplanned pregnancies can also add to the overall costs of college since time spent in the classroom or studying often means additional child care costs.

## The Risks of Being Uninformed

It is dangerous to assume that by the time a student enrolls at OSU, he or she is well informed about how to prevent pregnancy. That is not necessarily true. Many students grow up in homes where it is taboo to discuss sexual health or prevention of risky sexual behaviors. In addition, one in five unmarried young adults (22 percent) say they have never had sex education in school and of those who did, more than one quarter had it before they were 15 years old.

This course gives you an opportunity to learn more about sexual health at a time when it is highly relevant for you and your fellow college students. There are compelling reasons why this will benefit you personally, but it contributes to OSU's goals of improving retention and graduation.

For example, a study conducted by the National Campaign to Prevent Teen and Unplanned Pregnancy, found that while over 94 percent of unmarried young adults age 18–29 say that they have all the information they need to avoid having or causing an unplanned pregnancy, 11 percent say they know little or nothing about condoms and 42 percent say they know little or nothing about birth control pills. These are the two most common forms of contraception among college students.

## Misunderstanding Contraception

Students have low levels of knowledge about long-acting reversible contraceptives (LARCs), such as IUDs and implants. This is particularly unfortunate given that these are very effective methods of contraception and have been linked to significant reductions in an unplanned pregnancy. In addition, regardless of gender, age, or racial/ethnic group, the overwhelming majority of unmarried young adults do not want to get pregnant or get someone pregnant at this time in their lives. Yet, among these same individuals about one in five is using no contraception method at all and one in four use contraception occasionally.

Students often underestimate the effectiveness and overestimate the risk and side effects of contraception. While this chapter will provide you with more information on a variety of contraceptive methods, deciding what is the best method for you and your partner should be done in consultation with a health care provider. At OSU, students can receive contraceptive services at The Ohio State University Student Health Services (*Figure 7*). All women requesting a birth control method that requires a prescription need to have a contraceptive consultation. You can make an appointment by calling (614) 292-4321. You do not need an exam to start birth control.



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## STUDENT HEALTH SERVICES

Services

- ADD/ADHD
- Allergy Therapy
- Covid 19
- Dental Services
- Preventive Medicine
- Health Education Resources
- Health Records
- Gynecologic Services
- Contraceptives
- Polycystic Ovarian Syndrome
- Sexually Transmitted

### Contraceptives

There are many contraceptive options available through Gynecologic Services and most methods require a prescription:

- Birth Control Pills
- NuvaRing
- Ortho Evra Patch
- Depo-Provera
- Nexplanon
- IUD

Condoms are available through the [Condom Club](#) at the [Student Wellness Center](#).

### Birth Control

- Birth control methods requiring a prescription need to have a contraceptive consultation
- Written prescriptions from non-Student Life Student Health Services (SLSHS) clinicians can be filled at SLSHS
- Transfer prescriptions to SLSHS by providing medication name, phone number of the originating pharmacy and prescription number

**Figure 7.** Contraceptive services are available at [The Ohio State University Student Health Services](#).

## Choosing a Method of Contraception

People have used various forms of contraception for thousands of years. Today, we are fortunate to have many safe and effective options available to those wishing to prevent an unplanned pregnancy. There is not a best method that works for everyone. Each form of contraception has its pros and cons. Before choosing a method of contraception, you and your partner should consider these factors.

Keep in mind no form of contraception is fail-proof. But your chances or your partner's chances of getting pregnant are lowest if you correctly use your chosen method every time you have vaginal sex. If not, over the course of 1 year, 85 out of 100 couples who do not use contraception will become pregnant.

Contraceptive methods are often grouped by how they work. Detailed information on each type is provided in the Appendix at the end of this chapter. Remember, please talk with your health care provider or your wellness instructor if you have any questions about your options (*Figure 8*).



**Figure 8.** Don't hesitate to talk to your doctor or a student health services counselor at your school when choosing a form of contraception.

## Your Health Status

Do you have any issues, conditions, or predispositions that could limit your options? This could include issues like latex allergies, migraine headaches, family history of cardiovascular disease, blood clotting disorders, and many more concerns.

## The Frequency You Have Sex

Are you occasionally sexually active or are you having sex more frequently? Some contraceptive methods only require action when you are likely to have sex. Other methods require taking a daily action.

## Number of Sexual Partners

Are you currently in a sexually monogamous relationship or do you have multiple sexual partners? How likely is this to change? Some methods offer better protection against STIs than others.

## Desire to Have Children in the Future

You may have a strong desire to not become a parent at this stage in your life. Will you feel this way in three years? Five years? Ten years? Most contraceptive methods are reversible. However, pregnancy may be delayed due to residual effects of hormones. Also, acquiring an STI can negatively impact fertility.

## Effectiveness of Contraceptive Method

How important is it to you not to get pregnant or get someone pregnant right now? Some methods are highly effective if used correctly. Others are less likely to prevent pregnancy even when used consistently and correctly.

## Possible Side Effects

Some contraceptive methods have positive and negative side effects. Some can be good, such as reducing cancer risk. Others that can be negative, such as reduced sex drive.

## Your Comfort Level

It is important that you find a contraceptive method with which you are comfortable. If you are not comfortable with the method you have chosen, you are less likely to use it consistently.

# SEXUALLY TRANSMITTED INFECTIONS

**Sexually transmitted diseases (STDs)**, also known as **sexually transmitted infections (STIs)**, are caused by bacteria, viruses, and parasites that are transmitted from one person to another during sexual activity.

Sexually Transmitted Infections are a significant health challenge facing the United States. The Center for Disease Control and Prevention estimates that nearly 20 million new sexually transmitted infections occur every year in this country. Nearly half of these new cases are found in young people between the ages of 15 to 24, with an estimated one of four sexually active girls having an STI.

At OSU the two most common STIs are **chlamydia** and **human papillomavirus (HPV)**. All STIs are a potential threat to an individual's immediate and long-term health and well-being. In addition to increasing a student's risk for acquiring and transmitting HIV infection, STIs can lead to severe reproductive health complications, such as infertility and ectopic pregnancy. It is important to note that for many STIs, infected men and women may have minor or no signs and symptoms. It is therefore important for all sexually active individuals to talk with their health care provider regarding the need to get tested for STIs. Confidential STI and HIV testing is conducted at The Ohio State University Health Services.

In this section, we discuss different types of STIs, how each is transmitted, and how each is medically treated. The simple fact is that these infections can be prevented, and this chapter provides the information needed to protect yourself.

## The Science of the Whole Individual

## STD and STI

The term sexually transmitted disease has been used for several years. A newer term, **sexually transmitted infection (STI)**, has appeared in the literature referring to STDs and sexually transmitted infections that may not have all the definite characteristics of a particular disease. In other words, the two terms are now being used interchangeably.

### Bacterial STIs

Bacterial STIs can be treated and cured with antibiotics. However, once the bacteria have been eliminated from the body, there is always the chance for re-infection if precautions are not taken.

#### Chlamydia and Lymphogranulom Venereum

Chlamydia, a common bacterial STI in the United States, is caused by the bacterium *Chlamydia trachomatis* (*Figure 9*). According to 2021 CDC statistics, an estimated 2.5 million cases in people between ages 14–39 occur annually in the United States. Women under the age of 25 have a higher risk for infection because their cervix is not fully mature. CDC recommends annual chlamydia testing for women under the age of 25.



**Figure 9.** Chlamydia is a bacterial STI that can go unnoticed for years but eventually cause irreversible damage.

Even though the symptoms of chlamydia infection are usually mild or even absent, serious complications that cause irreversible damage, including infertility, can occur silently before a woman ever recognizes a problem. Up to 40 percent of women with untreated chlamydia develop pelvic inflammatory disease (PID). Women with chlamydia are also five times more likely to be infected with HIV when exposed to it. Chlamydia can also cause discharge from the penis of an infected man. Rarely, genital chlamydial infection can cause arthritis that can be accompanied by skin lesions and inflammation of the eye and urethra (Reiter's syndrome).

Chlamydia can be transmitted during vaginal, anal, or oral sex and women are frequently re-infected. Chlamydia is found in the throats of men and women who had oral sex. Chlamydia can also be passed from an infected mother to her baby during vaginal childbirth.

There are laboratory tests to diagnose chlamydia. Some can be performed on urine; other tests require that a specimen be collected from a site such as the penis or cervix. Chlamydia is usually treated with antibiotics.

**Lymphogranulom venereum (LGV)** is another STI caused by *Chlamydia trachomatis*. LGV causes swelling of the lymph glands in the genital area and genital papule, raised bumps, and genital ulcers. Rectal infection signs can be confused with those caused by ulcerative colitis. The numbers of LGV cases in the United States are unknown at this time. Antibiotics are the usual treatment.

## Gonorrhea

**Gonorrhea** is an STI caused by the bacterium *Neisseria gonorrhoeae* (**Figure 10**). This bacterium multiplies in the warm, moist, reproductive structures such as the cervix, uterus, and fallopian tubes in women, and in the urethra of both men and women. It also grows in the anus, eyes, mouth, and throat. Almost as common as chlamydia, the CDC reports about 1.6 million new cases of gonorrhea in the United States each year. The highest rates are found in teens and young adults and in African Americans. It is a common disease and one to which a person can easily succumb to re-infection.



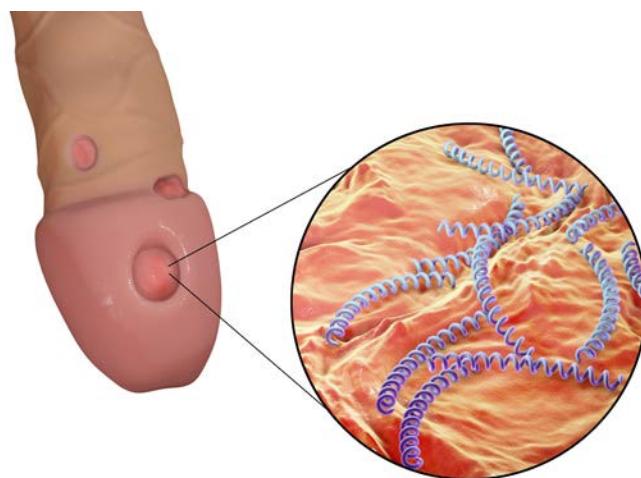
**Figure 10.** Gonorrhea multiplies in the reproductive organs and has symptoms similar to chlamydia.

The symptoms of gonorrhea infection are similar to chlamydia and can be mild or confused with other maladies. If left untreated, women will often develop PID and men will develop painful epididymitis—both result in infertility. If a woman becomes pregnant while infected with gonorrhea, it may cause blindness in the baby. Gonorrhea may also lead to throat or rectal infections. Gonorrhea can be life-threatening as it spreads to the blood or joints. Those with gonorrhea are more likely to contract and spread HIV.

Many people with gonorrhea also have chlamydia infections and are treated with antibiotics for both at the same time. However, drug-resistant strains of the gonorrhea bacterium are making treatment by antibiotics more difficult.

## Syphilis

**Syphilis** is caused by the bacterium *Treponema pallidum*. Syphilis is spread through sores on the lips, mouth, external genitals, vagina, anus, or rectum (**Figure 11**). The primary stage is typically a single chancre or sore. Without treatment, the primary stage advances to the secondary stage that consists of more sores in the form of a skin rash and mucous membrane lesions. In the late stage of the disease, syphilis can cause brain damage, paralysis, gradual blindness, and dementia. The infected person may also have a fever, sore throat, headaches, muscle aches, fatigue, and weight loss.

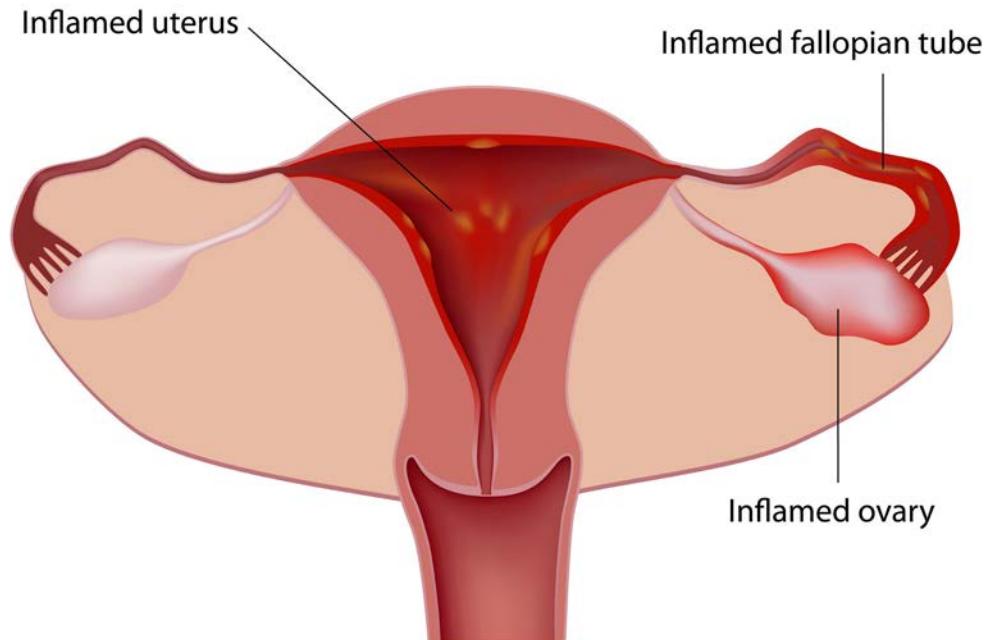


**Figure 11.** Syphilis is spread through sores and can eventually lead to serious health problems.

Syphilis is often called the great imitator because it is difficult to distinguish its symptoms from other diseases. There are about 41,000 new syphilis cases reported each year in the United States. The open syphilis sores make it five times easier to contract and spread HIV, and it is easy to get re-infected. People often get syphilis along with other STIs. If detected early, syphilis can be treated with penicillin.

## Pelvic Inflammatory Disease (PID)

*Pelvic inflammatory disease (PID)* is not an STI, but is a consequence of several STIs and occurs only in women. PID occurs in about 40 percent of women who have chlamydia or gonorrhea infections but have not been treated. The bacterial infection spreads from the cervix to the uterus, fallopian tubes, and other reproductive organs, possibly causing permanent damage and infertility (*Figure 12*).



**Figure 12.** PID can affect several of the female reproductive structures, often leading to permanent damage or dysfunction.

The bacteria cause scarring in the fallopian tubes. In addition to infertility, this scarring may cause a fertilized egg to be lodged in the fallopian tube, resulting in an *ectopic pregnancy*—a pregnancy that occurs outside the uterus and which may cause severe internal bleeding and even death of the pregnant woman. Other possible symptoms of PID include lower abdominal pain, foul-smelling vaginal discharge, painful intercourse, painful urination, and irregular menstrual periods.

PID is very difficult to detect and may be unrecognized in over 50 percent of cases. Antibiotics can be used to treat PID, but more severe problems require hospitalization and surgery. More than 100,000 women become infertile every year from PID, and about 1 million experience acute PID. PID is also the cause of most ectopic pregnancies.

## Protozoan STIs

A single-celled protozoan parasite, *Trichomonas vaginalis*, causes *trichomoniasis* or *trich*. Young women are especially susceptible to this STI, which is spread through contact with an infected partner. Itching in the genital area and a foul-smelling vaginal discharge are common symptoms in women. Men often do not have symptoms. Trich is treated with antibiotics, but it is easy to be re-infected.

# Viral STIs

Viral sexually transmitted infections cannot be cured by antibiotics. Scientists are working to develop vaccines. Once a person is infected with a viral STI, the virus will be present in his or her body throughout his or her life.

## Genital Herpes

**Genital herpes** is an STI caused by the herpes simplex virus HSV-2. The herpes simplex virus HSV-1 creates fever blisters and cold sores in the mouth and is not an STI. However, HSV-2 can cause sores in the mouth and HSV-1 can affect the genital area (*Figure 13*). A person with genital herpes gets small blisters in the genital or rectal areas. Often these blisters break, creating tender sores that take two to four weeks to heal.

Genital herpes may cause a newborn to die; therefore, for a pregnant woman with genital herpes, the baby is usually delivered by cesarean section to avoid infecting the baby. Antiviral medications can lessen outbreaks of the blisters, but there is no cure for genital herpes.

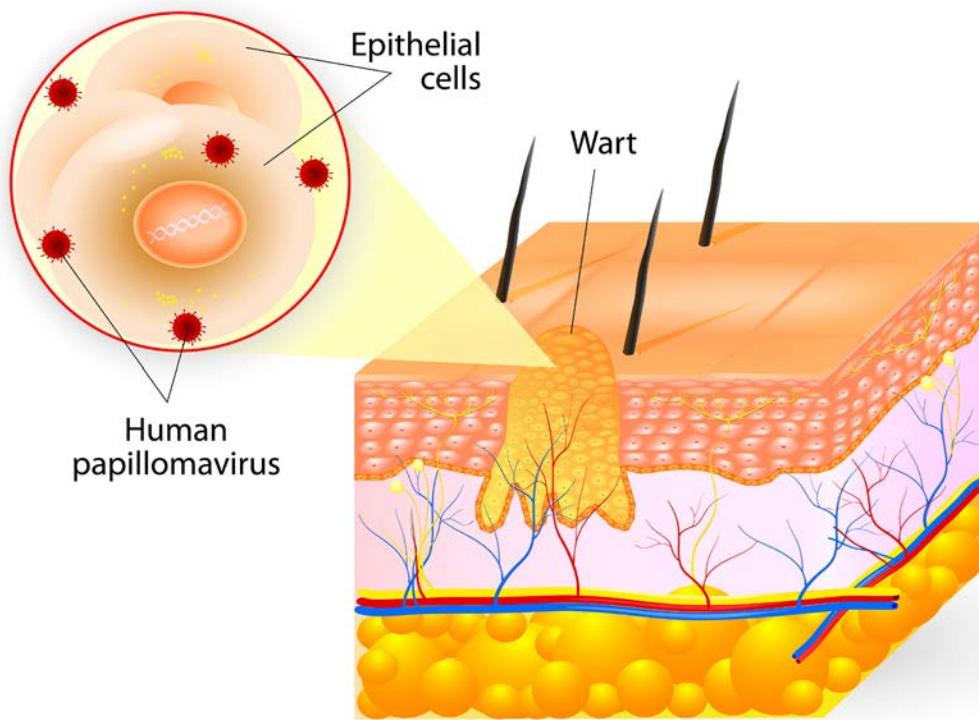


**Figure 13.** The herpes virus causes sores in the genital area or in the mouth.

## Genital Human Papillomavirus (HPV)

The human papillomavirus (HPV) is the most common STI in the United States. There are more than 40 different HPV viruses that are spread through genital or oral contact. Symptoms are either not present or appear as genital warts (*Figure 14*) or cervical cancer. Several reproductive organ cancers and oral cancers are possible with HPV, but are rare. A pregnant woman can pass HPV to her baby. In rare cases, the baby can develop warts in the throat, making it possible for the baby to develop *recurrent respiratory papillomatosis (RRP)*.

HPV is especially prevalent among college students with almost 60 percent of sexually active college women infected. Approximately 80 percent of sexually active people will be infected by HPV by the time they are age 50. A vaccination for women called Gardasil was approved in 2006 by the FDA. Sexually active girls and women ages 11–26 are encouraged to get this vaccination and to be tested for cervical cancer annually. The vaccine protects against four of the 40 different HPV viruses.



**Figure 14.** The human papillomavirus (HPV) attacks epithelial cells of the genitals, causing wart-like protrusions.

## Hepatitis B

There are many forms of hepatitis. The **hepatitis B virus (HBV)** is highly contagious and can be spread through close non-sexual contact. HBV is similar to HIV but more contagious. HBV is transmitted by sexual exchange of body fluids and other means of exchanging body fluids. The hepatitis B virus is a very serious virus that attacks the liver.

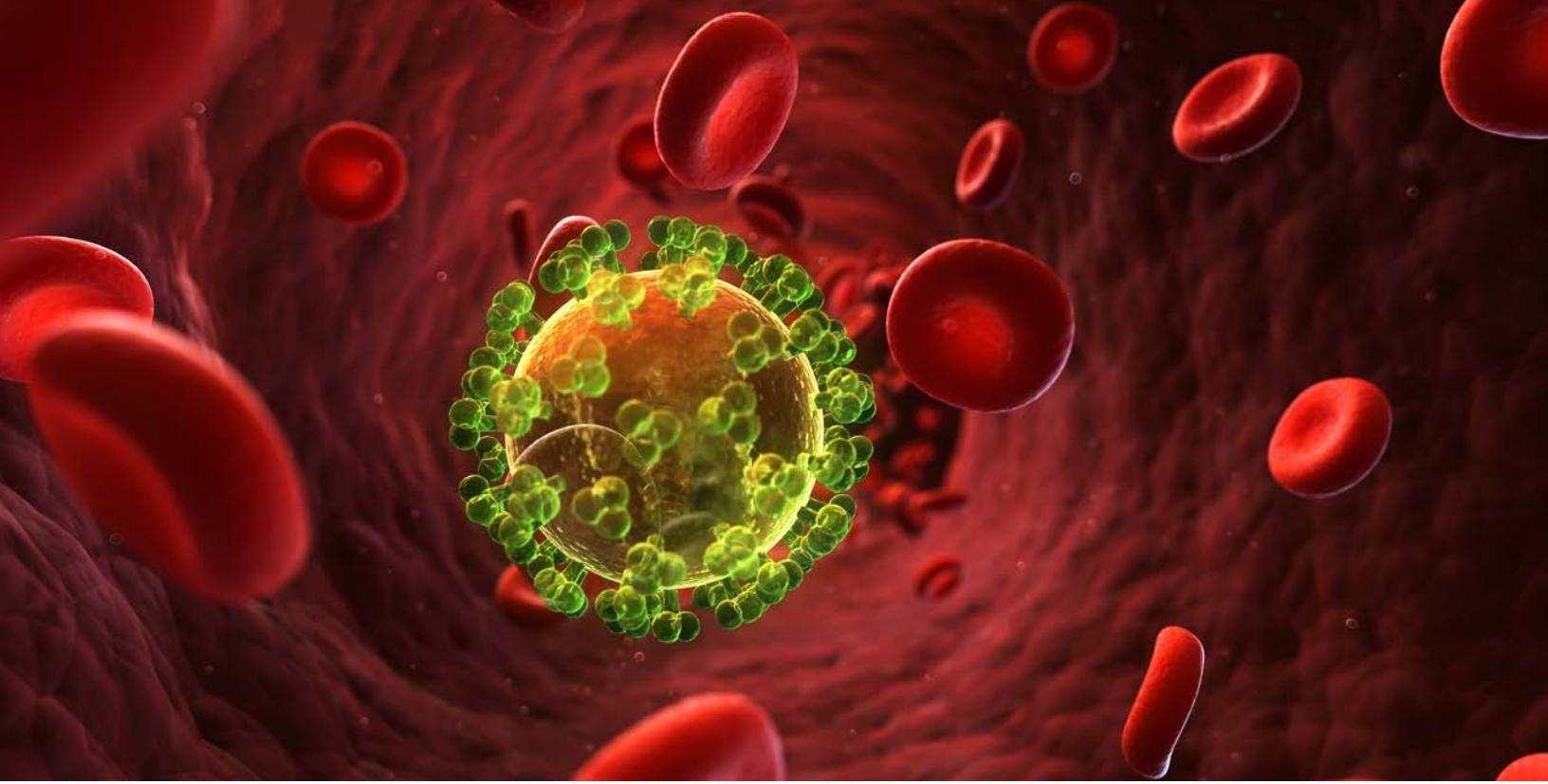
Many people infected with HBV do not show any symptoms but are carriers who can infect others. Mild symptoms are flu-like, including vomiting, abdominal and joint pain, jaundice, and fatigue. The greatest concern with hepatitis is liver failure and cancer of the liver. Death from chronic liver disease occurs in 15–25 percent of chronically infected people. Chronic infections occur in 90 percent of infants infected at birth, 30 percent of children infected between ages 1–5, and 6 percent of people infected after age 5.

There is a vaccine for HBV that is recommended for all people under age 19 and everyone who has multiple sex partners or injects illegal drugs.

## HIV/AIDS

The **human immunodeficiency virus (HIV)** is a sexually transmitted virus that damages the immune system and may eventually turn into *acquired immunodeficiency syndrome (AIDS)*. AIDS is a life-threatening later stage of HIV infection. Different viruses attack various parts of the body, but HIV attacks the immune system—the body's defense system against disease (**Figure 15**).

The deterioration of the immune system is evidenced by the reduction in CD4 T cells. When these cells drop to a critically low level, the individual is diagnosed with AIDS. Exactly at what point it is considered AIDS varies from country to country. When HIV has progressed to AIDS, the body has little or no defense left against infection or disease. HIV may be gradually destroying the immune system of a person for years before reaching the point of AIDS. **Antiretroviral medications** are being developed that prolong the onset of AIDS.



**Figure 15.** The HIV/AIDS virus attacks the body's immune system, specifically T cells, thus reducing the ability to defend against other infections.

A person may transmit HIV at any time after being infected. It is transmitted through the exchange of body fluids during sexual contact, injection of illegal drugs using contaminated needles, and through an infected mother's milk when breastfeeding.

The CDC reports that there is "substantial biological evidence demonstrating that the presence of other STIs increases the likelihood of both transmitting and acquiring HIV." STIs increase susceptibility to HIV in two ways. One is through ulcerative or other breaks in tissue caused by STIs. The other is by the increased HIV in genital secretions by those with STIs. Studies have shown that men with an STI and HIV have higher concentrations of HIV in their genital secretions. The higher concentration means that the carrier will be more likely to infect another.

Globally, AIDS continues to be a horrible epidemic. It is estimated that 79.3 million people have been infected with HIV and 36.3 million have died from AIDS. About 15 million children have become orphans due to AIDS. India now has more reported HIV cases than sub-Saharan Africa. With the enormous population in Asia, the World Health Organization (WHO) predicts vast numbers of people will become infected. In 2021, it was estimated that about 50,000 new cases occur in the United States annually. Many people have been infected but are not yet aware of it—about 75 percent of these cases are in men. In men, 67 percent of infections are due to male-to-male sexual contact (MSM), 16 percent due to high-risk heterosexual contact, 12 percent due to injection drug use, and 5 percent due to combined injection drug use and MSM. In females, 80 percent of the cases are due to high-risk heterosexual contact, and 19 percent due to injection drug use.

The only way for a person to know if they have HIV is to be tested. Many people are asymptomatic, and if a person does have symptoms they are easily confused with other illnesses. Some possible symptoms are rapid weight loss, profound fatigue, swollen lymph glands, and unusual blemishes on the tongue, mouth, throat, nose, eyelids, or under the skin. Tests for HIV look for the antibodies the body has created to fight the HIV, rather than the virus itself. Reliable tests have been approved by the U.S. government. A good source for reliable testing is the CDC's HIV testing centers database or the CDC hotline at 1-800-CDC-INFO.

## Infection Prevention

Abstaining from sexual activity, or **abstinence**, is your only guarantee against STIs. The next best thing is to be sexually active with just one other person who is only sexually active with you and that this person does not have an STI. Consistent and correct use of condoms can also reduce the risk.

In the chapter on chronic diseases, we will discuss the positive contributions of sexual activity in a long-term relationship. Because this chapter focuses on some of the negative effects of sexual activity, we do not want to give the idea that sexual relations are always a negative thing. In the context of a long-term, loving relationship with another, sexual intimacy has the potential to be a beautiful dimension of life.

If you do choose to be sexually active, what will you do to protect yourself from getting an STI? You must be wise enough to think beyond “it will never happen to me” long before you are faced with the prospect of having sex. If you aren’t prepared, it is perfectly fine to say “No” to sex. You need to be respectful of yourself and others and think of possible long-term consequences and not just the immediate situation.

Drinking and/or drugs are involved in most unplanned sexual encounters. Don’t drink in a situation that could result in sexual activity. Be very wise about what you drink to avoid drug-facilitated sexual assault—we discuss this later in this chapter.

We recommend the CDC prevention website to get the facts about STD prevention: [www.cdc.gov/STD/prevention](http://www.cdc.gov/STD/prevention).

## ABORTION

Because abortion is such a highly politically charged subject, it can be difficult to find objective information regarding abortion. This is the very reason it is included in this course. Deciding how to handle an unintended pregnancy is difficult. There are many options, including abortion, adoption, and parenting (*Figure 16*). It is important to understand the process, options, and consequences so individuals can make a more educated choice if they decide to consider abortion as one of their options if experiencing an unplanned pregnancy.

**Induced abortion** is the act of intentionally removing a fetus from the uterus by medication or instrumentation. A naturally occurring miscarriage is sometimes referred to as a spontaneous abortion. Our focus is on induced abortion, typically referred to simply as *abortion*.



**Figure 16.** Abortion is a difficult decision in any circumstance.

The Science of the Whole Individual

# Women's Rights

In the 1973 *Roe v. Wade* decision, the Supreme Court ruled that women, in consultation with their health care providers, have a constitutionally protected right to have an abortion in the early stages of pregnancy free from government interference. Subsequent legislation has given states the right to require counseling, waiting periods, and parental approval for minors. Many believe this limits a woman's right to access abortion services. The overturning of *Roe v. Wade* by the Supreme Court in 2022 has given legal precedence of abortion back to the states. Since the court's decision, many states have made abortion illegal.

The abortion rate has risen 7% from 13.5 per 1000 of women and girls of child-bearing age in 2017 to 14.4 in 2020. Based on current rates, 1 in 10 women will have an abortion by age 20, 1 in 4 by age 30, and 3 in 10 by age 45. Women in their twenties account for more than half of all abortions. Over half of all women who have abortions used a contraceptive method in the month they became pregnant.

Women give many reasons for seeking abortion services. Three-fourths of women say they cannot afford a child, three-fourths say that having a baby would interfere with work, school, or ability to care for other dependents, and half say they do not want to be a single parent or are having relationship difficulties. Women who are married or cohabitating with a partner account for 55 percent of all abortions. Over 61 percent of abortions are obtained by women who already have one or more children. Half of the women obtaining abortions have incomes that meet the definition of the federal poverty level.

If it is for the following reasons, the abortion is considered *therapeutic*:

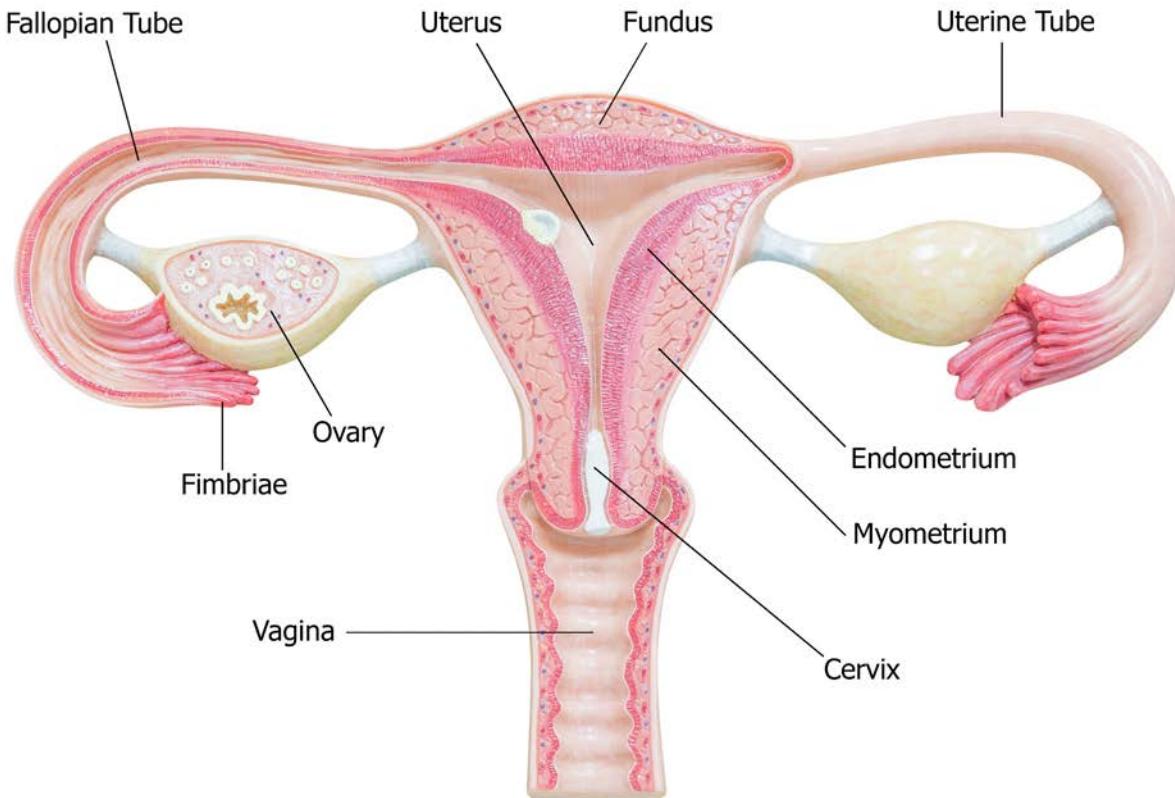
- To save the life of the pregnant woman.
- To preserve the woman's physical or mental health.
- To terminate a pregnancy that would result in a child born with a congenital disorder that would be fatal or associated with significant morbidity.
- To selectively reduce the number of fetuses to lessen health risks associated with multiple pregnancies.

If done for any other reason, an abortion is considered *elective*. There are several techniques that can be used to complete an abortion. These are grouped into two main categories: surgical abortion and medical abortion.

## Surgical Abortion

Early **surgical abortions** are most commonly done in a clinic or at a doctor's private practice location. Later surgical abortions are usually done in hospitals or special clinics. Ideally, the location that is chosen has a full range of services, including counseling. There are several surgical techniques that can be used.

**Menstrual aspiration** is performed within the first 1–2 weeks of the pregnancy. A speculum is inserted into the vagina so that a small tube may be inserted into the uterus through the cervix (*Figure 17*). With a syringe, the fetus is removed from the womb.



**Figure 17.** The female reproductive system

**Suction curettage** is the abortion procedure most commonly used during the first 12 weeks of pregnancy. It is also called *vacuum curettage*. The cervix is dilated either through drugs or devices that will stretch it so a plastic tube attached to a vacuum pump can be inserted into the uterus. The vacuum pump suctions the fetus from the womb. A curette is then used to scrape the womb to be certain all tissue has been removed.

From 13 to 21 weeks of the pregnancy, the abortion procedure is termed *dilation and evacuation* (D&E). Because the fetus is larger at this stage of pregnancy, the cervix needs to be opened more than for the suction curettage. This may be done with a combination of drugs and other devices. Once the cervix is ready, the fetus is removed with forceps and suction.

## Medical Abortion

**Medical abortion** is the term used when abortion is accomplished using drugs rather than surgery. The drugs act to cause the uterine lining to prevent the fetus from growing, and the uterus to contract to expel the fetus through the vagina. The drugs cause bleeding, cramping, and passage of tissue. Other common effects include nausea, vomiting, fever, and chills.

*Mifepristone* (RU-486) is taken together with Misoprostol under a health care provider's direction. Sometimes Misoprostol is placed in the vagina rather than taken orally. Other drug combinations are possible but not as effective. If this medical abortion procedure is not successful, the woman will need to have a surgical abortion.

## Abortion Health Risks

According to the American College of Obstetricians and Gynecologists (ACOG), abortion is a low-risk procedure, especially in the first weeks of pregnancy. Experts have concluded that there is no link between abortion and the risk of breast cancer, other cancers, infertility, and complications in subsequent pregnancies. Some research does suggest though that women who have multiple surgical abortions may be slightly more likely to have complications such as low birth weight and preterm birth in future pregnancies.

In terms of mental or emotional risks, there have been no scientific studies verifying a condition popularly known as post-abortion syndrome. Common sense would say that having an abortion would be a stressful time in the life of a woman. A spontaneous abortion or miscarriage is a tough time for most women. Depending on the woman's values and past mental or emotional history, her response to an abortion could be extremely negative. Many women choose to undergo extensive counseling after an abortion. To say this response will be the same for all women is an over-generalization. To say there will be no effect on a woman's mental or emotional state is equally naïve.

Research on how abortion affects men has been scanty and inconclusive. Often the father of the child has no knowledge that he was the father. Sometimes men encourage the abortion and some fight against it. It has been reported that men involved in the decision to have an abortion might experience increased anger and have difficulty relating well to women. It is also reported that relationships have a lower chance of succeeding after an abortion.

## SEXUAL ASSAULT AND HARASSMENT

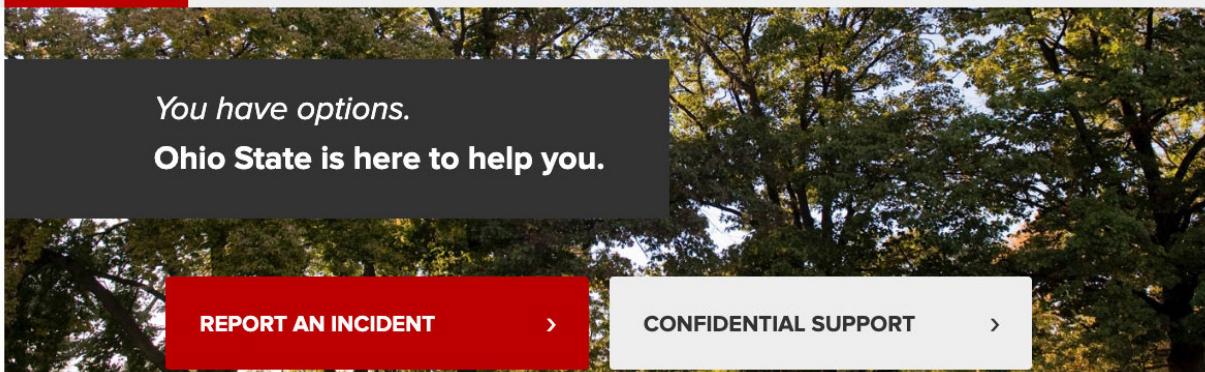
Sexual harassment and sexual assault is a common problem, perhaps more so on college campuses. ***Sexual harassment*** occurs when a person, a man or woman, makes unwelcome physical or verbal sexual advances to another person. Sexual harassment also includes offensive remarks about a person's sex or sexuality. ***Sexual abuse*** is a sexual activity during which a perpetrator uses force, violence, or threats, or otherwise takes advantage of, a victim who is unable and/or unwilling to give consent.

A large majority of sexual assault victims are women and girls, but men and boys are also at risk. In the United States, it is estimated that 22 million women and nearly 1.6 million men have been raped during their lives. Young people, college students especially, are at higher risk, and most victims know their assailant.

### Sexual Harassment

The government has played an active role in legislating against *sexual harassment* and trying to protect individuals in the workplace and on college campuses. This section focuses primarily on problems that are occurring in higher education and difficulties that you might encounter as a student.

The Ohio State University enacted a comprehensive policy to outline sexual misconduct on campus that applies to all OSU faculty, staff, and students. Parts of the policy related to sexual health are highlighted but to read the full version of OSU policies on sexual harassment, amorous relationships, and Title IX compliance, check out the OSU Office of University Compliance and Integrity website: <http://titleix.osu.edu/> (*Figure 18*).



**Figure 18.** You can learn more about The Ohio State University's policies on sexual harassment on the Office of University Compliance and Integrity [website](#).

## What Constitutes Harassment?

Sexual misconduct encompasses a broad range of unwelcome behaviors that are committed without consent or by force, intimidation, coercion, or manipulation. The term includes, but is not limited to, criminal sexual assault, sexual harassment, sexual exploitation, domestic violence, dating violence, and stalking. Sexual misconduct can be committed by men or women, and it can occur between people of the same or different sex.

OSU defines consent as "permission that is clear, knowing, voluntary, and expressed prior to engaging in and during an act." Non-communication constitutes lack of consent. By definition, the following conditions cause a person to be unable to give consent:

- Person is asleep or unconscious
- Person is incapacitated by drugs, alcohol, or medication
- Person is unable to communicate consent due to a physical or mental impairment
- Person has been threatened or coerced into giving their consent
- Person is under the age of 16

Engaging in sexual activity with someone who is unable to give consent is considered by law and OSU to be sexual misconduct. Indications of consent are irrelevant if the person is incapacitated. Consumption of alcohol, in and of itself, does not relieve a person of the responsibility to obtain ongoing consent.

## Report All Incidents of Sexual Misconduct

OSU takes all incidents of sexual misconduct seriously. If you or someone you know may be the victim of sexual assault or another form of sexual misconduct, you should immediately report the incident. To report sexual misconduct that happened on-campus, contact The Ohio State University Police Division. If the misconduct occurred off-campus, please contact the Columbus Division of Police (CPD) or the police department in the jurisdiction where it occurred.

- OSU Campus Police (614) 292-2121
- CPD Sexual Assault Unit (614) 645-4701
- CPD Domestic Violence & Stalking Unit (614) 645-7225

Students may confidentially disclose sexual misconduct to the Counseling and Consultation Service (CCS): (614) 292-5766, <http://www.ccs.osu.edu/>. Student disclosures made to the health care providers will be held in strict confidence.

## High Incidence of Sexual Harassment on College Campuses

In 2019, the American Association of Universities commissioned a nationally representative survey of undergraduate and graduate college students.<sup>2</sup> The survey found a high incidence rate of sexual harassment in colleges and universities. Their findings included these facts:

- **41.8%** of all students reported having at least one experience of sexual harrassment.
- **18.9%** reported sexual harrassment “interfered with their academic or professional performance,” “limited their ability to participate in an academic program,” or “created an intimidating, hostile or offensive social, academic or work environment.”
- **5.5%** of undergraduate women and **4.3%** of undergraduate men reported incidents by an instructor or faculty member. This statistic increased to **24%** of graduate women and **18.2%** of graduate men.

Many students experienced sexual harassment through electronic messages and other non-contact communication (*Figure 19*). Nearly one-third of the students reported being touched, grabbed, or forced to do something sexual. Sexual harassment occurs in classrooms, student housing, and basically anywhere else on campus.

Every college and university is required to have a grievance procedure for sexual harassment. Clearly, sexual harassment is going to be unsettling and anxiety producing. There is no need to suffer in silence. Institutions of higher education want you to receive the best education possible. That is why services are provided to help make your life during these college years amenable to your educational success.



*Figure 19.* Sexual harassment can take many forms, and you don't have to tolerate any of it.

## Sexual Assault

If you do not agree to have sexual relations with a person, then any sexual activity is considered sexual assault. It may be inappropriate touching, intercourse, attempted rape, or actual rape.

In January 2014, the White House Task Force to Protect Students from Sexual Assault was established. The Task Force was created to

- Raise awareness of the frequency in which sexual assault occurs at all school levels
- Let survivors of sexual assault know that they are not alone and that there are resources to help
- Ensure that colleges and universities across the country know how to develop a comprehensive plan to keep students safe from sexual assault
- Help schools live up to their obligations under Title IX of the Education Amendments of 1972 (Title IX) and effectively respond when sexual assaults occur

# Drug-Facilitated Sexual Assault

At least three drugs have been identified that are used in what is commonly called date rape:

- *GHB* (gamma hydroxybutyric acid)
- *Rohypnol* (flunitrazepam)
- *Ketamine* (ketamine hydrochloride)

These drugs, many times furtively dropped into a victim's drink (*Figure 20*) have been used primarily on women, but when used for other crimes they have been given to both men and women.

These drugs are extremely difficult to detect because they are mostly colorless and odorless when dissolved in a drink. GHB and Ketamine are legal in the United States. GHB is used as a general anesthetic and Ketamine is used by veterinarians, but Rohypnol is an illegal drug. They are used for rape because they have a numbing effect making the person unable to defend themselves from the perpetrator. Alcohol could very well be listed among these drugs.

The drugs are rapidly eliminated from the body, some within 12 hours. It is important to notify officials immediately if you suspect that you have been drugged or raped. Try to remember to not urinate, douche, or do anything to disrupt physical evidence.

Respect yourself. Be wise and don't put yourself in a potentially harmful situation where someone could slip a drug into your drink. Be wary of drinks that have already been mixed, such as those in a punch bowl. Try to always be with a friend so that you can look out for each other.

**Figure 20.** Date rape drugs can severely limit your ability to defend yourself from assault.



It was reported that 1 in 5 women on campus are sexually assaulted. Many take issue with that claim saying that across all campuses in the United States, the more accurate number may be 1 in 30. Still, others have made the claim that it is even more prevalent because so much of it goes unreported. It is difficult to know exact numbers. The reality is that even one assault is too many and every effort to eliminate sexual assault is warranted.

## Sexual Abuse

Research indicates that physical and sexual victimization are serious problems for adolescent and college-age women. In a national sample of college students, 32 percent of the women experienced physical violence by their dates (*Figure 21*). Other national statistics maintain that most rapes occur before age 24, and half of women who are victims of sexual assault are ages 12 to 24. Several longitudinal studies found that 66 percent of women had been the victims of sexual violence at least once between the age of 14 and their senior year in college. The reported violence included rape, attempted rape, and physical violence such as hitting, pushing, or having something hard thrown at them.



**Figure 21.** Nearly a third of college-age women have experienced physical violence by their date.

## Abuse by Intimate Partners

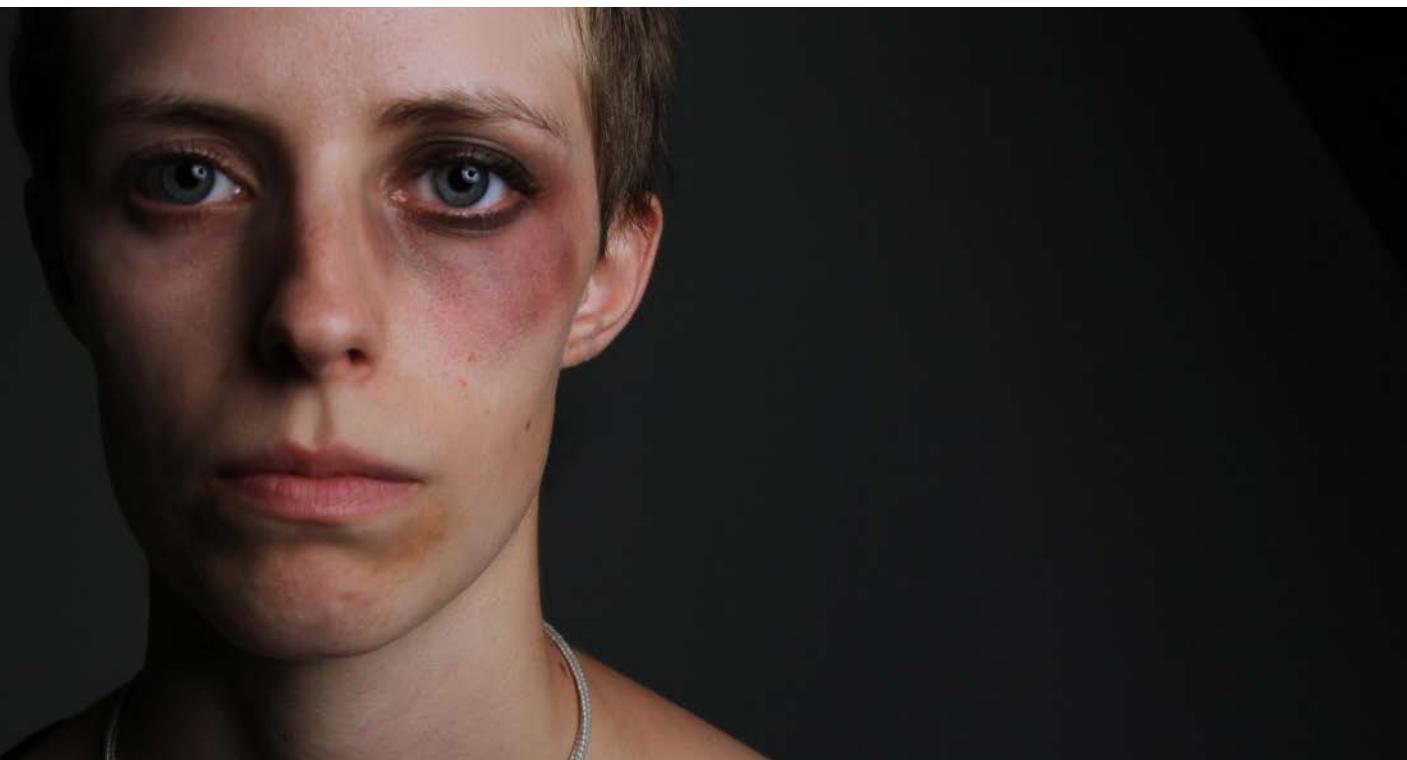
The National Center for Injury Prevention and Control (NCIPC) of the CDC reports that every year approximately 1.5 million women are physically assaulted or raped by an intimate partner. The NCIPC has a free publication that is available online, "Preventing Violence Against Women: Program Activities Guide," which has five major themes:

- Tracking the problem
- Developing and evaluating prevention strategies
- Supporting and enhancing prevention programs
- Providing prevention resources
- Encouraging research and development

## Sex as a Controlling Behavior

The prevalence of violence against individuals in our society today undermines our attempts at living a healthy lifestyle. So much of the violence comes at the hands of those we would normally expect to be trustworthy. A subtler form of control is preventing an individual from using protection during sexual activity with the intent of getting a woman pregnant. Recently it has been found that these controlling behaviors are instigated by men as well as by women to try to force the other person into a relationship with them.

There is an appalling frequency of abuse occurring in our homes, among peers, and in dating situations. No one should ever expect or accept being the victim of abuse. However, because of circumstances, many individuals find themselves truly victims in abusive situations. It behooves all of us to wisely prepare ourselves for the possibility of having to face some of these unhealthy sexual challenges (*Figure 22*).



**Figure 22.** We should prepare ourselves to address potential or actual sexual violence in our own lives and the lives of others.

## SEXUAL DYSFUNCTIONS

Sue Johanson, a sexual educator, counselor, and TV personality, is credited with the saying, "Sex is perfectly natural but rarely naturally perfect." Most sexually active adults will experience sexual difficulties at some point in their lives. These can be caused by physical health issues, emotional issues, performance anxiety, communication and relationship problems, as well as stress or fatigue.

The most common sexual difficulties for young adults differ based on gender. Women are more likely to express problems with lack of interest in sexual activity, inability to achieve an orgasm, and painful intercourse. Men, on the other hand, are more likely to report issues with premature ejaculation and performance anxiety.

Your health care provider can assist with sexual dysfunctions, particularly those related to a physical condition. Counselors and sexual therapists can also provide assistance for individuals whose issues are not a result of a medical concern. Many sexual difficulties experienced by young people can be the result of previous sexual traumas. In all these cases, the OSU Counseling and Consultation Service (<http://www.ccs.osu.edu/>) can be of assistance.

# MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Respect yourself and your body, and be true to your values.
2. Erase any naiveté by educating yourself about potential problems.
3. Act independently and wisely.
4. Avoid being lulled into thinking it cannot happen to you.
5. Put sexual relations into the context of your entire, wonderful life.

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# GLOSSARY TERMS

**Abstinence:** Refraining from sexual relations until married.

**Antiretroviral medications:** Medications used to treat infection caused by retroviruses, primarily HIV.

**Chlamydia:** A common bacterial sexually transmitted infection caused by the bacterium Chlamydia trachomatis.

Chlamydia can be transmitted during vaginal, anal, or oral sex and women are frequently re-infected.

**Genital herpes:** A sexually transmitted infection caused by the herpes simplex virus HSV-2.

**Gonorrhea:** A sexually transmitted infection caused by the bacterium Neisseria gonorrhoea. This bacterium multiplies in the warm, moist, reproductive structures such as the cervix, uterus, and fallopian tubes in women, and in the urethra of both men and women.

**Hepatitis B virus (HBV):** A highly contagious viral infection that can be spread through close non-sexual contact.

The hepatitis B virus is a very serious virus that attacks the liver.

**Human immunodeficiency virus (HIV):** A sexually transmitted virus that damages the immune system and may eventually turn into acquired immunodeficiency syndrome (AIDS).

**Human papillomavirus (HPV):** The most common sexually transmitted infection in the United States. There are more than 40 different HPV viruses that are spread through genital or oral contact.

**Induced abortion:** The act of intentionally removing a fetus from the uterus by medication or instrumentation.

**Lymphogranulom venereum (LGV):** A sexually transmitted infection caused by Chlamydia trachomatis. LGV causes swelling of the lymph glands in the genital area and genital papule, raised bumps, and genital ulcers.

**Medical abortion:** Using drugs rather than surgery to intentionally expel the fetus from the uterus.

**Menstrual aspiration:** An abortion that removes the fetus from the womb with a syringe. This type of abortion is typically performed in the first 1–2 weeks of the pregnancy.

**Sexual abuse:** Sexual activity during which a perpetrator uses force, violence, threats, or otherwise takes advantage of a victim who is unable and/or unwilling to give consent.

**Sexual harassment:** Occurs when a person—a man or woman—makes unwelcome physical or verbal sexual advances to another person. Sexual harassment also includes offensive remarks about a person's sex or sexuality.

**Sexually transmitted diseases (SDIs):** Diseases caused by bacterial, protozoal, or viral infections that are acquired through intimate sexual contact.

**Sexually transmitted infections (STIs):** Bacterial, protozoal, or viral infections that are acquired through intimate sexual contact.

**Suction curettage:** A type of abortion in which a vacuum pump removes the fetus and then a curette is used to scrape the womb to be certain all tissue has been removed. Suction curettage is most commonly used during the first 12 weeks of pregnancy.

**Surgical abortion:** An abortion done by a doctor in a doctor's office, clinic, or hospital.

**Syphilis:** A sexually transmitted infection caused by the bacterium Treponema pallidum. Syphilis is spread through the syphilis sores on the lips, mouth, external genitals, vagina, anus, or rectum.

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# APPENDIX 1

## Appendix 1: Contraceptive Methods: Mechanisms, Effectiveness, Advantages, Disadvantages, and Costs

### BEHAVIORAL METHODS

One or both partners change their sexual behaviors to reduce the risk of pregnancy.

#### Abstinence

##### 100% Effective

**Not having sex (vaginal, anal, or oral) at any time.**

#### How It Works

Through effective communication and self-control partners abstain from any form of sexual activity.

#### Effectiveness

0 pregnancies expected per 100 women.

#### Advantages

100% effective in preventing pregnancy and STI transmission when used consistently and correctly.

#### Disadvantages

Requires strong communication and self-management skills.

#### Costs

Not applicable.

### Natural Family Planning

##### 75% Effective

**Also known as the calendar or rhythm method. Requires a woman to know which days she is most fertile and to either abstain or use a barrier method on those days.**

#### How It Works

A woman who has a regular menstrual cycle has about 9 or more days each cycle that she is able to get pregnant. These fertile days are 5 days prior and 3 days after ovulation. In order to determine when she is ovulating (typically 14 days before her next menstrual cycle), a woman can check her cervical mucus and/or record her basal body temperature. During ovulation, cervical mucus is clear and slippery with an egg white consistency. A slight temperature increase of 0.4 to 0.8 degrees on a basal thermometer can indicate the first day of ovulation.

#### Effectiveness

25 pregnancies expected per 100 women.

#### Advantages

There are no side effects. Does not require a prescription, medical visit, or fitting. Minimal expense for supplies. Endorsed by most religions. Often used by couples trying to get pregnant.

### Disadvantages

Requires careful record keeping. Generally need at least 3 months of data to predict ovulation. Not very effective with typical use. No STI protection. Must refrain from sexual activity or use another method for at least 12 days per cycle (sperm can live 3–5 days in the female reproductive tract). May not work for women with irregular menstrual cycles.

### Costs

\$10–\$15 for temperature kits. Charts and classes are often free in health centers and churches.

### Withdrawal

##### 73% Effective

**Also known as *coitus interruptus*. Requires male partner to withdraw penis from the vagina prior to ejaculation.**

#### How It Works

The male partner must time withdrawal so that ejaculation occurs well away from the vagina and vulva.

#### Effectiveness

27 pregnancies expected per 100 women.

#### Advantages

Can be used as a method of last resort. Does not require a prescription, medical visit, or fitting. No expense. No negative health effects.

#### Disadvantages

Not very effective. No STI protection.

#### Costs

None.

### BARRIER METHODS

Male or female wears device that blocks the sperm from reaching the egg.

### Male Condom

##### 85% Effective

**Thin sheath made of latex, polyurethane, or lambskin that is placed over an erect penis prior to intercourse.**

#### How It Works

Male condoms keep sperm from entering the vagina by creating a physical barrier. Only latex and polyurethane condoms also protect against STIs. Spermicides can be

added to increase effectiveness in preventing pregnancy. Water-based lubricants can be used to increase comfort and sensation. Non-lubricated condoms are used for oral sex. To maintain effectiveness, store condoms in a cool, dry place and check the expiration date. Cannot be reused.

## Effectiveness

15 pregnancies expected per 100 women (latex and polyurethane without additional spermicide).

## Advantages

One of only two methods available to men. No prescription required. Offers some protection against STIs. May help prevent premature ejaculation. Inexpensive and readily available on college campuses. No negative health effects.

## Disadvantages

Does not protect against all forms of STIs (i.e., HPV, herpes on exposed skin). Requires disruption of sexual activity. Some men report decreased sensation. Possible allergic reactions to latex.

## Costs

Around \$15 per package. Center for Health Promotion and Wellness provides for free, as do some college health facilities. Also available in drugstores, gas stations, family planning centers, and vending machines.

# Female Condom

## 80% Effective

**Also known by the brand name, Reality Condom. Soft, loose-fitting polyurethane condom that is worn inside the vagina. Has two flexible rings: One ring is inserted into the vagina, behind the pubic bone and over the cervix (much like a diaphragm). The other ring remains outside the vagina.**

## How It Works

Female condoms keep sperm from entering the vagina by creating a physical barrier. It can be inserted up to 8 hours prior to intercourse. Protects both the vulva and the base of penis from STIs passed by skin-to-skin contact. Can also be used by either gender for anal sex.

## Effectiveness

20 pregnancies expected per 100 women.

## Advantages

No prescription required. Offers some protection against STIs, including HPV and herpes. Can be inserted 8 hours in advance of sexual activity. No negative health effects.

## Disadvantages

Requires preplanning or disruption of sexual activity. Cannot be reused. May cause vaginal irritation and allergic reactions.

## Costs

Around \$2.50 per condom. Center for Health Promotion and Wellness provides for free, as do some college health facilities. Also available in drugstores and family planning centers.

# Diaphragm

## 85% Effective

**Shallow latex cup that is used with spermicidal jelly or cream and placed over the cervix.**

## How It Works

Prior to sexual activity, spermicide is applied to the inside of the diaphragm which is then inserted behind the pubic bone in the vagina. The diaphragm holds the spermicide in place around the cervix to create a physical and chemical barrier. Must be left in place for 6–8 hours after intercourse. Additional spermicide must be added before each subsequent sexual activity (do not remove diaphragm). Should be taken out within 24 hours.

## Effectiveness

15 pregnancies expected per 100 women.

## Advantages

Offers some protection against STI. Can be inserted up to 6 hours prior to sexual activity. Can be left in place for additional sexual activity.

## Disadvantages

Requires prescription and initial fitting by health care provider. Does not protect against all forms of STIs. Requires preplanning or disruption of sexual activity. Must leave in place for 6 hours after sexual activity. Must reapply spermicide for each act of intercourse. Potential allergic reaction and vaginal irritation. May cause urinary tract infections. Risk of toxic shock if left in too long.

## Costs

\$0–\$75 for diaphragm; \$0–\$250 for the initial exam and fitting; \$10–\$20 for spermicide jelly or cream.

# Cervical Cap

## 77–83% Effective

**Thimble-shaped silicone cap that fits snugly over the cervix.**

## How It Works

Prior to sexual activity, spermicide is applied to the inside of the cervical cap, which is then inserted and suctioned onto the cervix. The cap holds the spermicide in place around the cervix to create a physical and chemical barrier. Must be left in place for 6–8 hours after intercourse. Should be taken out within 48 hours.

## Effectiveness

17–23 pregnancies expected per 100 women (17 for women who have not given birth; 23 for women who have had a vaginal delivery).

## Advantages

Offers some protection against STIs. Can be inserted up to 6 hours prior to sexual activity. Can be left in place for additional sexual activity.

## Disadvantages

Requires prescription and initial fitting by clinician. More difficult to insert correctly than diaphragm due to size. Does not protect against all forms of STI. Requires preplanning or disruption of sexual activity. Must leave in place for 6 hours after sexual activity. Potential allergic reactions and infections of the cervix. Cannot be used during menstrual cycle. Risk of toxic shock if left in too long.

## Costs

\$0-\$75 for cap; \$0-\$250 for the initial exam and fitting; \$10-\$20 for spermicide jelly or cream.

# Cervical Shield

**85% Effective**

**Commonly known by its brand name, Lea's Shield.**

**One size fits all silicon cup that has a one-way valve that creates suction to fit against the cervix.**

## How It Works

Prior to sexual activity, spermicide is applied to the inside of the cervical shield which is then inserted and suctioned onto the cervix. The shield holds the spermicide in place around the cervix to create a physical and chemical barrier. Must be left in place for 8 hours after intercourse. Should be taken out within 48 hours.

## Effectiveness

15 pregnancies expected per 100 women.

## Advantages

Offers some protection against STIs. Can be inserted up to 6 hours prior to sexual activity. Can be left in place for additional sexual activity. More effective than a diaphragm and cervical cap for women who have previously given birth.

## Disadvantages

Requires a prescription from a health care provider. Does not protect against all forms of STI. Requires preplanning or disruption of sexual activity. Must leave in place for 8 hours after sexual activity. Potential allergic reactions and infections of the cervix. Risk of toxic shock if left in too long.

## Costs

\$0-\$65 for cervical shield; \$0-\$250 for the initial exam and fitting; \$10-\$20 for spermicide jelly or cream.

# Contraceptive Sponge

**68-84% Effective**

**Soft, disk-shaped sponge made out of polyurethane foam containing nonoxynol-9 spermicide.**

## How It Works

Prior to sexual activity, the sponge is wetted and placed it

inside the vagina positioned over the cervix. Needs to be left in place for at least 6 hours after sexual activity. It can be left in place for up to 30 hours if additional sexual activity occurs.

## Effectiveness

16-32 pregnancies expected per 100 women (16 for women who have not given birth; 32 for women who have had a vaginal delivery).

## Advantages

No prescription required. Offers some protection against some STIs. Can be inserted up to 6 hours prior to sexual activity. Can be left in place for multiple acts of vaginal intercourse.

## Disadvantages

Less effective in women who have previously given birth. Does not protect against all forms of STI. Requires preplanning or disruption of sexual activity. Must leave in place for 6 hours after sexual activity. Potential allergic reactions and vaginal irritation. Risk of toxic shock if left in too long.

## Costs

\$7.50-\$15/package of 3 sponges. Available at family planning clinics, drugstores, and online.

# HORMONAL METHODS

Prevent pregnancy by eliminating ovulation, fertilization, and/or implantation of a fertilized egg.

# Oral Contraceptives: Combination Pill or "The Pill"

**95% Effective**

**A combination pill that contains both the hormones estrogen and progestin.**

## How It Works

The pill is taken daily to keep the ovaries from releasing an egg. Also changes the lining of the uterus to prevent implantation and thickens the cervical mucus to block the sperm from reaching the egg. For most effective use, each pill should be taken at the same time every day. Should use a backup method of contraception for the next 7 days after a missed pill.

## Effectiveness

5 pregnancies expected per 100 women. (Being overweight may increase the chances of getting pregnant while using the pill.)

## Advantages

Does not interfere with sexual spontaneity. Many different brands of pills to choose from. Potential positive side effects and health benefits (i.e., reduced risk of ovarian cancer). Regulates menstrual cycle.

## Disadvantages

Must be taken every day. No protection against STIs. Requires exam and prescription. Antibiotics may reduce effectiveness so a backup method must be used. Potential side effects

include dizziness, nausea, mood swings, weight gain, high blood pressure, blood clots, heart attack, stroke, and vision problems. Not recommended for women over the age of 35 who smoke, have a history of blood clots, and have a history of breast, liver, or endometrial cancer.

### Costs

\$0-\$50/month pill pack at drugstores; \$0-\$250 for the initial exam. Generics are available.

## Oral Contraceptives: Extended Cycle

### 95% Effective

Very similar to combination oral contraceptives except that they are taken consecutively for several months. Brands manufactured for continuous use contain pills for 12 weeks of combined hormones and 1 week of placebos. The woman can expect her menstrual period every 3 months.

### How It Works

Works the same way as combination oral contraceptives.

### Effectiveness

5 pregnancies expected per 100 women. (Being overweight may increase the chances of getting pregnant while using the pill.)

### Advantages

Same as combination oral contraceptives.

### Disadvantages

Same as combination oral contraceptives. May have spotting or bleeding between menstrual periods in the first few months.

### Costs

\$0-\$120 for three month supply; \$0-\$250 for the initial exam. Generics are available.

## Oral Contraceptives: Progestin-Only or "Mini Pill"

### 95% Effective

Contain small doses of progestin but no estrogen. Women who have cardiovascular disease risks, who suffer from estrogen-related side effects, or who are nursing may prefer progestin-only pills.

### How It Works

Thickens cervical mucus and thins the lining of the uterus preventing sperm from reaching the egg. May also suppress ovulation. Due to the low dose of hormones, it is very important that mini pills be taken at the same time every day. Should use a backup method of contraception for the next 48 hours if the pill is taken more than 3 hours late.

### Effectiveness

5 pregnancies expected per 100 women. (Being overweight may increase the chances of getting pregnant while using the pill.)

### Advantages

Does not interfere with sexual spontaneity. Decreased risk of endometrial cancer and pelvic inflammatory disease. No estrogen-related health risks. Regulates menstrual cycle.

### Disadvantages

Must be taken every day at the same time. No protection against STIs. Requires exam and prescription. May have spotting or bleeding between menstrual periods. Some women report weight gain and sore breasts.

### Costs

\$0-\$50/month pill pack at drugstores; \$0-\$250 for the initial exam. Generics are available.

## The Patch

### 95% Effective

Also known by its brand name, Ortho Evra, this skin patch is worn on the lower abdomen, buttocks, arm, or upper body.

### How It Works

The patch releases the hormones estrogen and progestin to keep the ovaries from releasing an egg. Also thickens cervical mucus to block the sperm from the egg. The woman puts on a new patch once a week for 3 weeks. She does not use a patch the fourth week in order to have her menstrual period.

### Effectiveness

5 pregnancies expected per 100 women. (May not work as well in women weighing more than 198 pounds.)

### Advantages

Does not interfere with sexual spontaneity. Potential positive side effects and health benefits similar to combination pills. Regulates menstrual cycle.

### Disadvantages

Must change patch weekly. No protection against STIs. Requires exam and prescription. Potential side effects similar to oral contraceptives. Serious side effects for some women. Risk of blood clots is 3 times higher than that of the pill.

### Costs

\$0-\$80/month at drugstores; \$0-\$250 for the initial exam.

## Vaginal Ring

### 95% Effective

Also known by its brand name, NuvaRing. Thin, flexible ring that is inserted into the vagina.

## How It Works

The ring releases the hormones estrogen and progestin to keep the ovaries from releasing an egg. Also thickens cervical mucus to block the sperm from the egg. The ring is left in the vagina for 3 weeks and then discarded.

## Effectiveness

5 pregnancies expected per 100 women.

## Advantages

Does not interfere with sexual spontaneity. Potential positive side effects and health benefits similar to combination pills. Regulates menstrual cycle.

## Disadvantages

Does not interfere with sexual spontaneity. Potential positive side effects and health benefits similar to combination pills. Regulates menstrual cycle. Lower exposure to estrogen than patch and combination pills.

## Costs

\$0-\$80/month at drugstores; \$0-\$250 for the initial exam.

## Shot/Injection 99% Effective

**Also known by its brand name, Depo-Provera.  
Injections of the hormone progestin every 3 months.**

## How It Works

The shot includes hormones to keep the ovaries from releasing an egg. Also thickens cervical mucus to block the sperm from the egg.

## Effectiveness

Less than 1 pregnancy expected per 100 women

## Advantages

Only need to get shot once every 3 months. Takes effect within 24 hours of injection. Does not interfere with sexual spontaneity. Decreased risk of endometrial cancer and pelvic inflammatory disease. No estrogen-related health risks. Periods become lighter or stop altogether.

## Disadvantages

Must visit health care provider every 3 months. No protection for STIs. Requires exam and prescription. Potential side effects of weight gain, sore breasts, and bleeding between periods. Not immediately reversible. Side effects may last up to 6 months after last shot. There may be a delay in fertility after stopping. Risk of decreased bone density.

## Costs

\$0-\$75/3-month injection; \$0-\$250 for the initial exam. \$0-\$150 for future visits.

## IMPLANTABLE DEVICES

Long-acting reversible contraceptive (LARC) devices are inserted into the female body and left in place for several years.

## Implantable Rod

**99% Effective**

**Also known by its brand names, Implanon and Nexplanon. Thin, flexible rod about the size of a matchstick that is inserted under the skin of the upper arm and releases progestin.**

## How It Works

The rod releases hormone to thicken cervical mucus and thin lining of the uterus preventing sperm from reaching the egg. May also suppress ovulation. Rod is left in place for 3 years.

## Effectiveness

Less than 1 pregnancy expected per 100 women.

## Advantages

Only needs to be replaced every 3 years. Does not interfere with sexual spontaneity. Decreased risk of endometrial cancer and pelvic inflammatory disease. No estrogen-related health risks. Lower dose of progestin than other methods. Periods become lighter or stop altogether.

## Disadvantages

Must be inserted and removed by a health care provider every 3 years. No protection for STIs. Requires exam and prescription. Potential side effects of weight gain, sore breasts, and bleeding between periods. Not immediately reversible. There may be a delay in fertility after removal. Risk of decreased bone density.

## Costs

\$0-\$800 for exam, implant, and insertion; \$0-\$300 for removal

## Intrauterine Devices (IUDs)

**99% Effective**

**A small plastic, flexible device that is placed in the uterus by a health care provider.**

## How It Works

Two types on the market in the United States, Copper IUD—also known by its brand name ParaGard—releases small amounts of copper into the uterus that prevents the sperm from reaching and fertilizing the egg. If fertilization does occur, the IUD keeps the fertilized egg from implanting. It can remain in place up to 12 years. Hormonal IUDs are known by the brand name Mirena (5 years) and Skyla (3 years). Both release progestin into the uterus, which keeps the ovaries from releasing an egg and causes the cervical mucus to thicken. It also affects the ability of a fertilized egg to implant in the uterus.

## Effectiveness

Less than 1 pregnancy expected per 100 women.

## Advantages

Only needs to be replaced every 3, 5, or 12 years. Does not interfere with sexual spontaneity. Mirena and Skyla have no estrogen-related health risks and a lower dose of progestin. Periods become lighter or stop altogether. ParaGard has no hormones.

## Disadvantages

Must be inserted and removed by a health care provider. No protection for STIs. Requires exam and prescription. There is a potential for tearing of uterine wall, pelvic inflammatory disease, and ectopic pregnancy. ParaGard may increase cramps and menstrual bleeding.

## Costs

\$0-\$1,000/exam, insertion, and follow-up visits.

# PERMANENT CONTRACEPTIVE METHODS

Non-reversible birth control methods for those who are sure they never want to have a child or they do not want any more children.

## Sterilization Implant

**99% Effective**

Also known by its brand name, Essure. This non-surgical method requires a health care provider to use a thin tube to thread a tiny spring-like device into each fallopian tube.

## How It Works

Implant causes scar tissue to form around each spring. This blocks the fallopian tubes and stops the egg and sperm from joining.

## Effectiveness

Less than 1 pregnancy expected per 100 women.

## Advantages

Offers permanent protection against pregnancy. Does not interfere with sexual spontaneity. One-time expense and procedure. No negative effects on health or sex drive.

## Disadvantages

Can take 3 months for scar tissue to form. Must be tested to see if scar tissue has fully blocked tubes. No protection from STIs. The procedure must be performed by a health care provider. Often a high initial expense. There is potential for infection and ectopic pregnancy. Procedure is permanent.

## Costs

\$0-\$2,000/interview, counseling, exam, procedure, and follow-up.

# Female Surgical Sterilization

**99% Effective**

Also known as a tubal ligation. This is a surgical procedure that either cuts, ties, or seals the fallopian tubes.

## How It Works

Surgery seals shut the fallopian tube so that the sperm and egg cannot meet.

## Effectiveness

Less than 1 pregnancy expected per 100 women.

## Advantages

Offers permanent protection against pregnancy. Does not interfere with sexual spontaneity. One-time expense and procedure. No negative effects on health or sex drive.

## Disadvantages

No protection from STIs. The procedure must be performed by a health care provider. High initial expense for the procedure (can cost 6 times as much as a vasectomy). There is potential for infection and ectopic pregnancy. Procedure is permanent.

## Costs

\$0-\$10,000/interview, counseling, exam, procedure, and follow-up.

# Male Surgical Sterilization

**99% Effective**

Also known as a vasectomy. This is a surgical procedure that cuts, ties, or seals the vas deferens.

## How It Works

Minor surgery that involves the cutting and tying off of the vas deferens.

## Effectiveness

Less than 1 pregnancy expected per 100 women.

## Advantages

Offers permanent protection against pregnancy. Does not interfere with sexual spontaneity. One-time expense and procedure. No negative effects on health or sex drive. Procedure can be reversed.

## Disadvantages

Must have semen analysis conducted after 3 months. No protection from STIs. The procedure must be performed by a health care provider. Initial expense for minor surgery.

## Costs

\$0-\$1,000/interview, counseling, exam, procedure, and semen analysis.

# EMERGENCY CONTRACEPTION

Used if the primary method of birth control fails. Not to be used as a regular method of birth control.

## Emergency Contraception: “Morning After Pill”

**99% Effective**

Also known by brand names such as Plan B, One-Step, or Next Choice. High-dose oral contraceptives with either progestin-only or estrogen and progestin that are taken in a single or double dose after unprotected intercourse. Ella, available only by prescription, can be taken up to 5 days after unprotected intercourse.

### How It Works

If taken within 72 hours of unprotected intercourse, emergency contraception stops the ovaries from releasing an egg or keeping the sperm from joining the egg. Will not cause an implanted egg to abort.

### Effectiveness

1 pregnancy expected per 100 women (reduces risk by 75–89%). (Being overweight may increase the chances of getting pregnant.)

### Advantages

Only contraceptive option available after unprotected intercourse. Some forms are available over the counter for women 18 years of age or older.

### Disadvantages

Potential side effects include nausea, vomiting, abdominal pain, fatigue, headaches, dizziness, irregular bleeding, and breast tenderness.

### Costs

\$30–\$65; some available over the counter.



Healthy Living Within Society

## Are My Relationships Healthy?

Close relationships with friends and family are key to health and longevity. This is one extremely important healthy behavior that is often neglected in the wellness literature. Not having close personal relationships has been found to be as detrimental to health as smoking 15 cigarettes a day or being an alcoholic. Studies have demonstrated that not having strong social support is even more harmful to health than being obese or not exercising.

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Relationships take many forms. When it comes to health, all relationships are important. We have discussed many facets of the significance of your attitude toward yourself and the power of self-respect. In this chapter, we begin by exploring how personality and relationships affect health.



## After reading this chapter, you will be able to:

- › **EXPLAIN** how optimism and a positive outlook benefit your relationships.
- › **PRACTICE** using your mind and body to communicate with others effectively.
- › **EXPLAIN** how integrity, developing interests and talents, and environmental awareness enhance your relationships and your well-being.
- › **DESCRIBE** the ways in which long-term relationships benefit your well-being.
- › **IDENTIFY** key elements in developing and maintaining long-term relationships.
- › **EXPLAIN** how you can deal with loneliness in healthy ways.



*Figure 1.* When something uncomfortable happens, do you dwell on the cause?

# Are My Relationships Healthy?

healthy living within society

## MAINTAIN A POSITIVE OUTLOOK

Dr. Steven Maier is one of the founders of ***positive psychology***, which focuses on mental wellness rather than mental illness. This positive thinking has redirected the field of psychology and greatly influenced contemporary psychological practices. These attributes and attitudes affect all relationships.

### Learned Helplessness

During their doctoral studies in psychology at the University of Pennsylvania, Steven Maier and Martin Seligman developed the ***learned helplessness*** hypothesis. From their research, they discovered that when a person was confronted with an uncontrollable situation, he or she would ask, "What was the cause?" Three basic classifications of causes and resulting consequences were identified:

- **STABLE:** The cause is going to last forever; results in long-lasting helplessness.
- **GLOBAL:** The cause is going to affect everything rather than some specific thing; results in a general, rather than specific, helplessness.
- **INTERNAL:** The cause is me rather than some external cause; results in helplessness and poor self-esteem.

These observations led Seligman to conclude that individuals have a ***personality*** characteristic of the explanatory or ***attributional style*** (*Figure 1*). If people give stable and global explanations for causes, they are at risk of failure to respond—in other words, learned helplessness. If people blame themselves, they are prone to a poor sense of self and learned helplessness.

With the introduction of this rational aspect of human behavior—that a person can analyze the causes of these uncontrollable events—Seligman began thinking that the opposite was possible. If one can learn helplessness, then why is it not possible to learn optimism? The earlier experimental research into learned helplessness set the foundation for his new direction into positive psychology.

## Learned Optimism

Seligman discovered that the explanatory style of an individual is the main determinant of whether a person will be optimistic or pessimistic. Pessimists blame themselves for negative experiences and believe these events affect everything and last a long time. By gaining ***learned optimism***, optimists see problems in a clearer perspective as events that occur but can be resolved. Optimists tend not to blame themselves but see the problem in an objective manner and work to solve the problem (*Figure 2*). Optimists actually see the problem as a challenge and are motivated to deal with it rather than feel defeated. The two groups approach life difficulties with completely opposite viewpoints. It isn't too hard to realize which approach is the healthier one!



*Figure 2.* Through optimism, you'll be able to deal with problems objectively.

## Optimism as a Characteristic for Success

The explanatory-style theory says that successful people have three important characteristics: aptitude, motivation, and optimism. An interesting twist is that Seligman sees some value in pessimism. He maintains that pessimism can keep individuals from moving forward optimistically when realistically there would be too many down-side risks. However, for the most part, pessimism is negative and results in poor health and depression. Seligman sees pessimism coming from learned helplessness. He believes that most depression is not only biochemical but also a result of the person feeling unable to respond positively to challenges—in other words, learned helplessness.

This move in his research from the negative to the positive led Dr. Seligman to develop a new branch of scientific psychology called positive psychology. The main premise is that positive psychology “studies the strengths and virtues that enable individuals and communities to thrive.” Historically, psychology has been devoted to understanding mental illness. Positive psychology focuses on mental wellness.

By overcoming the negative behaviors associated with feeling helpless and pessimistic, and learning to be optimistic, an individual will be on the way to complete mindbody wellness in four important ways:

- **STRONGER IMMUNITY.** Optimism improves health throughout a person's life by strengthening the immune system.
- **ACTIONS THAT REDUCE ILLNESS.** Optimists are proactive and are more likely to take action that will prevent illness or get treatment when they are sick or hurt.
- **REDUCE RISK OF BAD EVENTS.** Optimists will also do things that will help them avoid bad experiences, when possible.
- **HEALTHY RELATIONSHIPS.** Social support is linked to better health. Optimists will tend to cultivate friendships and good relationships, whereas pessimists may tend to isolate themselves from others (*Figure 3*).

We now move on from discussing these explanatory styles of optimism and pessimism to an understanding of the immune power personality. Keep in mind that Seligman emphasized that optimists are "unfazed by defeat. Confronted by a bad situation, they perceive it as a challenge and try harder."



**Figure 3.** Pessimists tend to isolate themselves from others, which only increases their level of pessimism.

## Immune Power Personality

Consistent with the thinking of positive psychology, Henry Dreher has written about personality traits that are effective in helping us to stay healthy. The following traits have been identified as those that promote **happiness** and health affecting the whole person.

Each trait has been linked to improved immune functioning. Taken together, Dreher has identified them as the *immune power personality*. These traits are all possible to acquire—they can be learned. Each of us can develop them to strengthen our abilities to get healthy, stay healthy, and develop healthy relationships that also contribute to our health. As you study these seven traits, identify the ones that you might have already developed and are working for you.

- **ATTENTION, CONNECTION, EXPRESSION (THE ACE FACTOR).** People who are tuned in to mindbody signals of discomfort, pain, fatigue, distress, sadness, anger, and pleasure cope better psychologically, have a better immune profile, and a healthier cardiovascular system.
- **THE CAPACITY TO CONFIDE.** Individuals who confide their secrets, traumas, and feelings to themselves and others have livelier immune responses, healthier psychological profiles, and far fewer incidences of illness.

- **HARDINESS.** The concept of *personality hardness* includes the “three Cs”—a sense of *control* over one’s quality of life, health, and social conditions; a strong *commitment* to one’s work, creative activities, and/or relationships; and a view of stress as a *challenge* rather than a threat. People who exhibit the three Cs suffer far fewer chronic illnesses and symptoms than those who don’t. Other investigators have found that hardy individuals have stronger immune systems.
- **ASSERTIVENESS.** People who assert their needs and feelings have stronger, more balanced immune responses. They more readily resist and overcome a range of diseases associated with dysfunctional immunity, from rheumatoid arthritis to AIDS. Immune power has connections to other traits as well, including the ability to find meaning in stressful life circumstances.
- **AFFILIATIVE TRUST.** Individuals who are strongly motivated to form relationships with others based on unconditional *love*, rather than frustrated power, have more vigorous immune systems and reduced incidence of illness.
- **HEALTHY HELPING.** People committed to helping others, referred to as *altruism*, discover they personally receive a “helper’s high” that is not only mental and spiritual, but physical as well. These individuals, displaying the personality trait of altruism, suffer fewer illnesses than those who are not similarly motivated or engaged (*Figure 4*).
- **SELF-COMPLEXITY.** People who explore many facets of their personalities, or *self-aspects*, can better withstand stressful life circumstances. People with many self-aspects are less prone to stress, depression, physical symptoms, and bouts of flu and other illnesses in the wake of stressful life events. They also have higher self-esteem and strengths to fall back on when part of them is lost or wounded.



**Figure 4.** Helping others is proven to boost your mental, spiritual, and physical well-being.

These immune power personality traits point us to a dynamic perspective for life. They are all attitudes, behaviors, styles, and traits that can be learned. What characteristics did you find that correlate with learned optimism? Being optimistic will also go a long way to helping you adopt the seven immune power personality traits that will strengthen your ability to relate to others in a healthy manner.

# Emotional Resilience

**Hardiness** has become the standard of an emotionally resilient personality. The Hardiness Institute was founded by Salvatore R. Maddi, a professor at the University of California, Irvine. According to Maddi, “when you can navigate professional and personal challenges in a way that furthers your goals, strengthens your ability to turn adversity to advantage, and deepens professional and personal meaning, you succeed as an employee and as a person. That is the way of hardiness.”

Adopting an internal locus of control and an attitude of seeing stress in a positive way as a challenge rather than a threat (eustress) and applying these to life circumstances fosters **emotional resilience**. The emotionally resilient person is able to bounce back after difficult or trying situations. They are able to employ good communication skills, show caring or empathy toward others, and exude optimism. These qualities contribute to a positive persistence in maintaining good personal relationships and a deeper sense of social conscience.

## Flow

Although a component of various worldviews for centuries, Dr. Mikaly Csikszentmihalyi has popularized the concept of **flow** in contemporary thinking. Flow, in a sense, is taking emotional resilience to a higher level. It is like emotional resilience in that it calls on similar qualities of personality and character. Flow, however, is far more than resilience—it is the epitome of focus and effort. Flow comes with total immersion in a creative endeavor. It’s like Michael Jordan “in the zone,” or Mikhail Baryshnikov leaping above the heads of the other dancers—their performance exceeds what they thought was their personal best.

Flow is something that when experienced takes you to a tremendous natural high. All distractions seem to disappear when you are intent on what you are doing. It is not something you can force or regulate, but you can put yourself in a position to invite the flow experience more often. It comes when you are totally focused in a positive way on an endeavor that is highly challenging and requires a high degree of skill. People have experienced flow in learning situations, music, sports, at work, and probably most every human endeavor. When you experience flow, what you are doing, although requiring great effort, feels effortless—as if you are transported into another state of being. The absorption into the activity is so satisfying that there is no need for some kind of external affirmation or reward. The feeling of flow is intensely rewarding and can be recalled in an instant years after the experience.

According to a Harvard Medical School Special Report on Positive Psychology, the flow experiences have these common characteristics:

- You lose awareness of time.
- You aren’t thinking about yourself.
- You aren’t interrupted by extraneous thoughts.
- You have clear goals at each moment but aren’t focused on the outcome but rather the activity itself.
- You are active.
- You work effortlessly.
- You would like to repeat the experience.

The report also suggests ways to help you prepare for a flow experience:

- Discover new things about your abilities and aim to surprise yourself.
- Choose an activity in which you have new feelings and insights and allow them to flow without interfering.
- Pay attention to your bodily sensations and posture.
- Accept that physical symptoms of nervousness will ease off as you continue.
- Focus on what you want and don't let mistakes be distracting.
- Try to involve others.
- Keep a good sense of humor.

This kind of experience is not limited to elite performers, although it does require a great deal of focus and concentration. It comes with intense effort and motivation on your part. Flow is not going to come to a couch potato. These are experiences that accompany extra effort that are worth more than money can give. Flow is one expression of the joy that comes with living life to its fullest.

## Mindbody Signals

There is one thing for certain—your mindbody relationship is here to stay! So why not take advantage of the power of this relationship to help you to be healthy?

Your beliefs make all the difference. These beliefs will reflect your level of optimism or pessimism. Do you worry about being unhealthy, or do you believe that you can regularly enjoy good health? Are you positive about your life and its meaning and purpose? Are you positive about the lives of others? The positive energy you exude will attract other positive people and fill your life with meaningful experiences (*Figure 5*).

Are you interested in getting to the underlying causes of problems and illnesses? Often people will ignore warning signs or even intentionally mask them to expedite a quick fix, without even looking for the cause. It is far more worthwhile to engage your best thinking, along with effective treatments, to discover the cause and rid yourself of the difficulty so you can move on.

Every mindbody relationship is highly unique. It is good to learn from others, but it is also important to increasingly trust your own intuition. Eliminate those behaviors that bring tension to your life and embrace those that make you healthy and feel good in mind and body.



*Figure 5.* Your positive energy will attract other people who have positive energy.

# COMMUNICATING WITH OTHERS

Positive and effective communication is basic to good, healthy relationships. Speaking, listening, and body language are all aspects of communication that express how we feel about ourselves, and influence how we relate to others.

## Touching and Relating

Touch is obviously a crucial part of our relating as infants and children, but research substantiates that touch in all personal relationships is vital to health and healthy relating (*Figure 6*). There definitely is significant mindbody communication taking place via touch.



**Figure 6.** Physical touch can be a strong component of emotional health and supportive relationships.

Brain research indicates that the release of the hormone oxytocin, which is the basis for feeling trust, occurs at the time of a warm supportive touch. The message communicated by the supportive touch is that the person is not alone in dealing with challenges. This same touch also leads to a reduction in the main stress hormone, cortisol. When the prefrontal region of the brain that controls emotion is free of stress, it is more capable of doing other necessary brain functions, such as problem-solving.

While touch is healthy and healing, it can also be very distressing for someone who has been abused or in some other way hurt by touch. It is extremely important to either ask for and receive permission before touching someone, or at least be very sensitive to body language that may be telling you to back off. Rather than judging someone for not wanting to be touched, it is a worthwhile effort to extend yourself and really try to understand why he or she is uncomfortable with touch. Your empathy may be the impetus another needs to eventually learn to trust being touched and benefit from it.

# Missing Touch in Online Relationships

An extremely popular way of relating today is through the Internet. Social networking is taking place among all age groups. It certainly provides a means of communicating that keeps old friends in contact and facilitates the making of many new friends. As with anything positive, it also has its risks and inherent dangers. If you have been the victim of an online predator, you know it's a horrifying experience. As many safeguards as possible must be taken so that you or your loved ones do not become a target for someone who does not have your best interests in mind.

Online dating has resulted in many happy marriages and relationships. It has also resulted in many broken hearts. One of the inherent difficulties in online relating is that you do not relate with mindbody reality and wholeness. Not being able to look someone in the eye may keep you from being able to wisely discern his or her intentions. With touch being such a basic part of relating and a basic aspect of healthy living, it is a void in online relating that is not easily overcome by only emotional or cognitive sharing.

## Confiding in Others

For over 20 years, Dr. James W. Pennebaker has been publishing research concerning physical and mental health problems associated with traumatic experiences. He finds that most people are able to cope quite well with major trauma and do not experience any mental or physical health problems. However, about 30 percent of the population undergoing traumas do experience lifestyle changes such as unhealthy sleeping, eating, exercise, or drinking patterns. In turn, each of these disruptions in healthy behaviors results in unhealthy biological changes including suppression of the immune system, elevated cortisol levels, and cardiovascular and neurotransmitter changes. Pennebaker and others have found that talking about and writing about traumatic experiences assist individuals to cope more effectively. There is no simple explanation as to why this is the case—it is complex and highly individual when it comes to how people deal with major traumas. However, evidently putting thoughts into words and giving them expression is therapeutic.

One aspect of the recovery process is that expressing feelings removes a person from an isolated state (if they have not expressed anything) and engages them in much needed socially supportive networks of people (*Figure 7*). Related research indicates that, generally, men have a more difficult time expressing feelings than women. Improved expression of feelings on the part of men enhances receiving psychological and social support and results in healthier relationships.



**Figure 7.** Talking about your feelings, challenges, and worries with a close confidant will lead you to better emotional and physical health.

## Listening

Listening is a significant part of successful communication. EduGuide ([www.eduguide.org](http://www.eduguide.org)), an award-winning non-profit online service to help people attain academic success, has developed an acronym for healthy listening:

**H = Hugs** - Show some sign of appropriate physical touch, such as a hug, and comfort to the one to whom you are listening.

**E = Empathy** - Show with words and body language that you understand the other's feelings.

**A = Attention** - Make sure the person knows you are focused on him or her.

**L = Listening** - Try first to understand what the person is saying.

**T = Time** - Do not rush the conversation; give the person time to talk about his or her concerns and feelings.

**H = Hear** - Listen to the meaning of the words and in a natural manner affirm that you understand; work with the person to make sure you really do understand his or her meaning.

**Y = Yielding** - Put aside other concerns while you listen; plan time in the near future to try to resolve a difficult problem if you cannot do so immediately.

When we practice healthy listening, we are setting the stage for healthy relationships. Good listening is not terribly commonplace. Often people who are supposedly listening are actually contemplating what they want to say next in the conversation rather than really listening to the other person (*Figure 8*).



**Figure 8.** Are you really listening, or just thinking of what you'll say next?

Another common problem is putting everything being said in the context of our own experience, again thinking about ourselves more than thinking about the person to whom we are supposedly listening. When we do this we often give a response that reflects our experience; for example, “Oh, yes, when that happened to me, I....” Then we launch into an explanation about our experiences, and the person to whom we are talking wonders “How did we end up here?” In the meantime, that person may feel as if the one to whom he or she is talking is not listening at all, or doesn’t even care about what is being said. This attitude reflects on the relationship, which may end up being quite shallow.

Some people have tried to adopt listening techniques to show they are actively listening, but these don’t always work the way the listener intended. One notorious technique teaches a person to parrot back to the one speaking what they have been saying as an indication that they are listening. We say “notorious” because many frustrated children have had to put up with parents using this technique—you may have been one of them! This technique is frustrating because it can be annoying to have what you have just said repeated without any additional input. It is also annoying because it is clear that a technique is being employed rather than experiencing an interaction with a person who is genuinely compassionate and caring.

Of course, this goes for any relationship and not just parent to child. Although, sometimes it may be helpful to repeat something the person has said. The point is that we can adopt listening techniques, thus improving our ability to listen, but the techniques should always be secondary or supportive of our efforts. The technique must not become a substitute for conscientious concern or attention. Is there room for improvement in your ability to listen?

## Speaking

Almost every facet of life—whether personal or a part of your career—involves speaking in such a manner that you make yourself understood. You may find yourself (more than you anticipated) trying to communicate your thoughts to small or large groups of people. Along with a fear of snakes or heights, one of the greatest fears people have is speaking in public.

For many, it takes some doing to get over this fear and to become adept at public speaking. It may be difficult just to speak up in class. One of the best opportunities available to hone speaking skills is to take a class in public speaking. No matter what your career direction, this is an important course in a well-rounded education. If public speaking is not required for your degree, take the initiative to find a good course in public speaking in which you can enroll.

More than likely, most of the speaking you will ever do is with one or two other people. However, many have trouble or could improve upon even this level of speaking. This can be especially important in more formal settings, such as a job interview. Here are a few tips to help you reduce stress between yourself and persons to whom you are talking:

- Avoid using common words or phrases in place of articulating the point you are making—for example, “think outside the box,” “perfect,” “just saying,” and “bang for your buck.” Focus on making the point rather than trying to sound clever.
- Avoid annoying words or phrases such as “you know” or the overuse of “like” in your speaking. Take note of how often you use these words and then strive to replace them with better choices.
- Be respectful of others by making your point and then giving them a chance to talk—don’t hog the conversation.
- Stay positive—your influence will be greater if you are more positive and less sarcastic or cutting.

Awareness on your part will help you avoid feeling stressed by conversations or public speaking and also avoid putting stress on others. Your speaking manner and your conversational skills play significant roles in the health of your relationships.

## Timeliness of Your Communication

Procrastination can greatly add to the stress in your life. If you’ve put off doing an assignment or studying for a test, you know exactly how uncomfortable that feels! Try to develop the habit of attending to a detail as soon as it comes to you; this includes communicating with others. When you receive a request via phone, e-mail, or regular mail, respond to it as soon as possible. When you communicate in a timely manner, you show respect to others and build trust in the relationship. In a workplace or education environment, it shows you are a competent employee or student. Responding to others in a timely manner may also increase the chance they’ll do the same for you. Also, the longer you wait to respond, the more likely you will put it off indefinitely or forget to respond altogether.

Also be respectful of others when you expect them to respond back to you. If you are assigning tasks to others or just asking for some assistance, try to give them adequate time to do what is asked. Your lack of planning ahead should not be the cause of a crisis in someone else’s life. You can earn the respect of others if you are respectful of their time.

## Conflict Resolution

Conflict in relationships is certainly not desirable, but it is not necessarily all bad either. If you are walking on eggshells to avoid conflict, you may also be avoiding potential growth. Constructive criticism—with emphasis on constructive—may help you to better understand your own behavior. A conflict between two people may produce a similar result. With greater understanding between you, the relationship may even be strengthened by the efforts you put forth to resolve your differences (*Figure 9*).

# Genuineness in Relationships

A classic work on relationships that was popular on college and university campuses in the 1960s and 1970s and is still read today is the book *I and Thou*, by philosopher Martin Buber.<sup>7</sup> The main premise of the book is that it's in relationships that we find meaning in life. In everyday relationships, we merely use each other to get something, but we do not really connect as we interact.

Buber characterizes these relationships as *I-It relating*. His writing encourages mankind to move to more sincere and genuine relating in which both parties are cognizant of their own personal meaning and value, and from that basis treat each other with mutual respect. In the relating the two connect and find meaning from each other. This is *I-You* or *I-Thou relating*.

The *interest-based relational approach (IBR)* to resolving conflict arises out of healthy interdependence. A starting point in trying to resolve a conflict is to put your relationship and your respect for one another first. Establish the facts surrounding the conflict and try to understand why it has occurred. Listen to the other person before trying to defend your own position.

Most importantly, be sure to keep behavior separate from the individual. See the person as an individual apart from his or her behavior. Then the focus is on the problem and off the individual, reducing possible erosion of your relationship while dealing with the conflict. Once you have established a healthy perspective on the issue you can work to an effective resolution.



**Figure 9.** When two people resolve a conflict in a positive manner, their relationship can actually be strengthened.

# Be Aware How You Express Yourself

The way in which you express yourself matters, and it is important that you understand how you are presenting yourself to other people.

## Aggressiveness

Aggressiveness is more like bullying behavior; it differs from assertiveness because it is not based on respect for yourself and for others. Aggressiveness could result in hurting others physically and/or emotionally. Especially make sure you are not being aggressive when you are communicating while angry; this is an easy time for aggression to creep in unconsciously (*Figure 10*).



**Figure 10.** Aggressive communication can hurt the relationship and have lasting emotional effects.

## Assertiveness

**Assertiveness** is behaving confidently based on respect for yourself and for others. Being assertive is healthy behavior and positions you for healthy relationships. When you are assertive you are honest about your feelings, and this always helps with good relating. You can be honest without being mean or disrespectful. You never want to hurt the other person, so you learn how to express yourself in a caring but truthful manner.

Assertiveness is not gauged by always getting what you want. The advantages of being assertive pertain more to being at peace with yourself and having positive relationships. You realize that you cannot control others, nor do you want to try to be in charge of how they feel or act. Accompanying this attitude is the awareness that someone else cannot make you act or feel a certain way either. You feel more in control of your life, which is in your hands, and is demonstrated by your confidence.

## Passiveness

Contrasting assertiveness with passiveness, when you are too passive in your communication you fail to express your honest feelings. A passive tendency is to hide or block your emotions. This is extremely detrimental to your health and to healthy relationships. Passive communication also reduces the chance that issues important to you are addressed—your voice is less likely to be heard.

## Body Language

Consider body language that is characteristic of assertiveness, aggressiveness, or passiveness. Aggressive body language could be characterized by glaring at someone, tension, anger, tight jaw, or clenched fists. Passive body language, on the other hand, would probably involve avoiding eye contact, fidgeting, hiding, or slouching. The assertive body language will include calmly looking directly into another's eyes, absence of anger and fidgeting, and showing a positive countenance, a gentle face, possibly smiling (*Figure 11*).



**Figure 11.** Our body language can emphasize our words, or in some instances, expose our real attitude.

How you move your body while communicating may be an unconscious decision, as you are more likely to be thinking about your words rather than your movements. To be an effective communicator, try to focus on what you are doing with your body; put it to use to convey what you are trying to say and what type of conversation you are expecting.

## PRESENT A HEALTHY AND CONFIDENT YOU

Communicating with another individual, such as a long conversation with a friend or a brief exchange with a cashier at a grocery store, is the most common interaction that you will have each day. Healthy listening skills are important in all situations. However, it is important to be aware that you are *always* communicating to the world by how you act and how you present yourself (*Figure 12*).

Presenting yourself in a positive and healthy way doesn't mean doing what you think others expect of you. It means being confident in yourself and your values and treating the world with respect. So, in this section, we'll discuss basic principles that are essential to communicating who you are.



**Figure 12.** Remember that you are always communicating: think about how you want the world to see you.

## Integrity and Trust

Someone once said that **integrity** is *not thinking poorly of yourself*. In math, you study integers, which are whole numbers, not including a fractional part. The Latin root of the word integer means *untouched* or *complete*. If we act with integrity, we are true to our values and not duplicitous or deceitful. We cannot be divided against ourselves. We do what we say we are going to do. The virtue of integrity leads to **trust** in relationships. Trust allows one to rely on the integrity of another person and have confidence in them. In turn that makes them a valued companion with whom we can openly talk to about our problems and turn to in times of need. It is one of the greatest aspects of relating that you can enjoy. The mental and emotional peace that comes with trust may be an underlying component contributing to health as much as any of our healthy lifestyle behaviors.

Professor Doug Oman with the School of Public Health at the University of California, Berkeley, and colleagues from Santa Clara University and Stanford University published an article promoting college courses for stress management and spiritual growth.<sup>8</sup> The justification for proposing such a course is because of growing evidence of the health benefits of increased spirituality that incorporates high levels of trust and integrity. Attempts to foster integrity and trust in our behavior clearly enhance wellness.

## A Sense of Contentment

Everyone has talents. Some may be quite adept at sports, music, or art. Others are naturals at sales or have a charisma that helps them to be influential with others. No matter what natural gifts one has, everyone has abilities that can be developed.

Research maintains that if we more fully develop our capacities, we put ourselves in a position to form healthy relationships and retain health and well-being, especially in difficult times. Having a more solid foundation will minimize vulnerability. The important thing is to do the best we can with what we have. A sense of contentment while we are striving will help us keep from overachieving or underachieving.

Such contentment also diminishes the temptation to compare oneself to others. The contentment within yourself will also help others to foster similar feelings toward you. Competitiveness is fine in sports but deadly in relationships. Research shows that cooperation trumps competitiveness when it comes to personal relating and in work relationships. While relating, competitiveness leads to manipulative behavior. This inevitably leads to discomfort and disgruntled feelings.

## THRIVING WITH LONG-TERM RELATIONSHIPS

Dr. Harry Reis, co-editor of the *Encyclopedia of Human Relationships*, presented 10 evidence-based ways that love and health connect through long-term relationships. Most of the research has been conducted on married couples, but Reis believes these benefits apply to any close relationships, such as with a partner, friend, or parent. The key, says Reis, is to “feel connected to other people, feel respected and valued by other people, and feel a sense of belonging” and then these benefits accrue:

**FEWER DOCTOR'S VISITS AND SHORTER HOSPITAL STAYS.** Loving relationships are good for health in a similar way that self-respect is good for health. When you know someone cares for you, you tend to take better care of yourself. Those in the relationship also help care for each other. Unhappily married couples are more susceptible to heart attacks and cardiovascular disease than happily married couples. Learning to resolve conflict with some degree of warmth expressed will help couples to be healthier. Women in marriages in which there is no warmth expressed while dealing with a conflict are at higher risk for heart problems. Men, on the other hand, were prone to heart problems if control became an issue in the relationship. In one study, the wife holding her husband's hand calmed his brain similar to the effect of a pain-relieving drug.

**LESS DEPRESSION AND SUBSTANCE ABUSE.** Social isolation is linked to higher rates of depression. Recent studies show that within two years after high school, people in a romantic relationship are less apt to abuse drugs or alcohol. Those not in a relationship were 40 percent more likely to use marijuana. The conclusions were that a healthy, romantic relationship gives the social support that people need and keeps them from an environment in which they tend to drink excessively and use drugs.

**LOWER BLOOD PRESSURE.** A study measuring ambulatory blood pressure revealed that lower blood pressure accompanies people in marriages that are happy and is not present in those who are in unhappy marriages. It is not marriage, per se, but the quality of the marriage. However, marriage still trumps being single when it comes to health. Singles with strong relationships did not fare as well as happily married couples, but they did have lower blood pressure than unhappily married couples.

**LESS ANXIETY.** An interesting study demonstrated that romantic love can reduce anxiety in long-term relationships. Previous research has indicated that romantic love in a marriage diminishes within a short time. What this study found was that long-term romance had the intensity, sexual interest, and engagement, but not the obsessive aspect that is typically part of new relationships. Many have also believed that the only long-term love is a form of companionship love devoid of romance. This study challenges that idea, concluding that if the couple only has companionship love without the romance, their marriage will not be as happy.

**NATURAL PAIN CONTROL.** In long-term relationships, there are fewer complaints of back pain and headaches. Feelings of love enhance the brain's ability to keep pain under control. Years of research has verified that having a loved one present helps to reduce feelings of pain during medical procedures and in various other settings, compared to increased feelings of pain for those who are alone. In a UCLA study, 25 women who were in long-term relationships had painful stimuli applied to them under varying experimental conditions, including holding a squeeze ball, holding a stranger's hand, viewing a photo of a chair, or viewing a photo of their romantic partner. The conclusions were that the social support perceived from viewing the photo of their loved one resulted in the greatest reduction of pain. It seems as if a picture is worth more than a thousand words!

**BETTER STRESS MANAGEMENT.** Loving social support helps us deal with stressful situations. Social support is not the same as social contact. Social contact comes with being around people, but social support gives a form of sustenance that contributes to wellness and reduces the effects of negative stress. Family and close friends usually give more genuine care than a large number of superficial friendships. It is good to have several close friends so that you do not over-tax one friend, and different friends can be supportive in different ways. Knowing that you belong is basic to wellness. Just having friends does not have the same supportive effect if you feel that you do not fit in.

**FEWER COLDS.** When people are happy, lively, and calm, they are said to have a positive emotional style. Anxious, hostile, and depressed people have a negative emotional style. Positive emotional style attracts positive relationships that are characterized by loving interactions and better resistance to illness. A group of 193 healthy volunteers were given a test to see if they had a positive or negative emotional style. Then the participants were given nasal drops containing an influenza virus or a rhinovirus. Those volunteers with a positive emotional style reported fewer symptoms than expected after the exposure to both viruses. The researchers concluded that positive emotional style plays a more significant role in health than we previously thought (*Figure 13*).



**Figure 13.** People who feel connected with others—who feel valued and respected—experience many physical health benefits such as lower blood pressure, fewer doctor visits, and fewer colds.

**FASTER HEALING.** Hostility in a relationship can increase the likelihood of being ill, and acquiring chronic diseases at younger ages, than if the relationship was free of discord. There is growing evidence that negative emotions in a relationship work against our health, whereas positive emotions foster better health and wellness. This factor parallels individual attitudes and behavior.

One study of 42 physically healthy married couples analyzed inflammation levels and healing from a superficial burn administered as part of the study. The rate of healing was compared to the hostility levels of the couples. The more hostile couples recovered at only 60 percent of the rate of those with lower hostility. These same researchers have been studying emotions and the immune system for many years at Ohio State University. Their studies continue to shed light on the interactive nature of our whole being, and that harmony within each one of us is highly correlated with harmony with others.

**LONGER LIFE.** The healthy behaviors that you choose to live are also behaviors that contribute to a healthy relationship. Long-term relationships, primarily marriage, are the ones that yield the greatest longevity. There are fewer risks of sexually transmitted diseases, and spouses tend to help protect one another by encouraging each other to live healthy lifestyles. Additional factors are the financial advantages of being married, and married men and women tend to drink less alcohol than single people. Having the connectedness between the couple throughout all the challenges of life helps to counteract loneliness. All of these factors contribute to better health and longevity.

Data from the National Center for Health Statistics indicates that regardless of age, sex, race, education, income, or country of birth, married adults are healthier than unmarried adults in all categories (*Figure 14*). Marriage also results in better care for each other by older couples than their cohabiting peers.



**Figure 14.** Happily married people tend to be healthier and live longer than both single people and unhappily married people.

**HAPPIER LIFE.** Happiness is experienced as couples help each other deal with difficult situations. Happier married couples hug every day, forgive each other, and stick together on issues rather than taking separate sides. Another important characteristic of happily married couples is they never go to sleep while angry with their spouse. They resolve any difficulties before going to sleep. Psychologists continue to agree that married people are the happiest people. More people report that their happiness comes from their marriage more than from money or their career.

# NURTURING LONG-TERM RELATIONSHIPS

Healthy relationships are important to your well-being, but just like keeping your body fit, nurturing long-term relationships requires a commitment that comes from within you. All dimensions of you contribute to the health of your relationships.

## Interdependence with Others

Stephen Covey based his best-selling approach to personal development on the *maturity continuum*. In the maturation continuum, a person grows from dependence to independence to interdependence. As babies we are *dependent* on others in every dimension of our being—physically, emotionally, mentally, socially, spiritually, and financially. As we mature we begin to grow more independent in each of these areas, and eventually we are able to take care of ourselves rather than relying on others. To become *interdependent*, we must first be independent.

Dependency robs a person of the opportunity to be interdependent. If we mature well, we move from others having to take care of us to being able to take care of ourselves. Eventually, we realize that relationships are vital to our lives, and we think of living life in relation to one another. Living interdependently means that you are able to share with others, find meaning in relation to others, and draw from the abundant resources available to make life rich and full.

It's quite challenging to become independent in every dimension of life. If you are still relying on the acceptance of others to feel good about yourself, then emotionally you are still dependent on others.

If someone is solving your problems for you, you are mentally dependent on others. Covey maintains that it takes a good deal of character development to reach independence. The satisfaction of doing this is rewarding in itself, but more importantly, it establishes the foundation we need to relate well and become interdependent. However, retaining independence alone throughout life can be a selfish or hedonistic way to live. Reaching interdependence facilitates the giving of ourselves to help better the lives of others.

## Intimacy

Often, when people hear the word intimacy they think that only applies to sex—but there is so much more to intimacy than that. Sexual relations are among the most intimate, but there are other aspects of intimacy in relationships that may be present in relationships that are not sexual.

An intimate relationship is a very close one between two people that resides in the mature realm of interdependence. The intimate relationship is characterized by strong emotionally supportive bonds, honestly and deeply confiding in one another, frequent relating, trust, deep feelings of belonging and approval, and feelings that each person is benefiting from the relationship (*Figure 15*).

Understanding these dimensions of relating and making them part of your life will enable you to relate more deeply in all of your relationships. In a relationship in which you experience sexual relations, these emotional dimensions of intimacy may very well give the relationship more depth than sex does.



**Figure 15.** An intimate relationship is built on support, trust, and belonging.

## Sexual Intimacy

Sexual relations can build a bond between two people when they exclusively share in this way. Most adults, about 90 percent, seek after or are in a long-term committed romantic relationship. In such a relationship, psychologists distinguish between two types of love—passionate love and companionate love. Euphoria, intimacy, and intense sexual attraction characterize passionate love. Companionate love is characterized by affection, trust, and genuine concern for the well-being of the other, even putting their interests above one's own. The ideal long-term romantic relationship involves both types of love.

Passionate love may be very intense initially, but that intensity may be rather short-lived—sometimes only a few months. However, companionate love endures and can grow stronger over the many years of the relationship. Affection is always a part of companionate love but will be experienced in the context of trust and the bond developed over years. When selfishness is put aside and the well-being of your loved one is your central concern, companionate love can be one of the most satisfying and joyful experiences of life.

## Secure Relationships

Adult relationships can be rated as secure, avoidant, or anxious. If you are able to draw close to others and have others depend on you, you will be able to form secure relationships. If you have difficulty trusting others and getting close to them, then you form *avoidant* attachments. In *anxious* attachments, you feel emotionally needy and fear rejection. These attitudes often result in others not wanting to get close to you.

A study that examined data from over 5,000 adults found a correlation between the nature of adult attachment and chronic diseases. Those who had insecure or avoidant attachments were at higher risk of developing cardiovascular problems and other conditions that were especially painful. This research affirmed previous studies linking insecure relationships with pain but introduced new findings that linked insecure relationships with cardiovascular problems. The researchers concluded that insecure attachment may be a risk factor for a wide range of health problems, and that counseling or other interventions aimed at improving attachment security could have definite positive health benefits.

# Disruptions to Long-Term Relationships

Being aware of potential major disruptions to long-term relationships early on in your life will help you avoid difficulties before they arise. Prevention is certainly emphasized in terms of wellness, and the same holds true for healthy relationships.

## Co-dependence in Relationships

Co-dependence stems from a very poor sense of self and from low self-esteem. Somewhere fairly early in the maturity process, the individual did not grow from being dependent to being independent. Even as an adult the person is very dependent emotionally. This leads to being very needy emotionally and often leads to addictive relationships and/or addictions to substances or sex. From a basis of self-loathing, the person sacrifices what they need or want in order to please others. This leads to additional emotional pain that may be intolerable enough that addictions are used to escape the hurt and anguish.

Co-dependent relations are very unhealthy and are usually characterized as dysfunctional. The difficulty is that the co-dependent behavior can be misconstrued as simply a natural part of the role of caretaker. Being kind, doing things for others, and putting others first are all positive behaviors, but these behaviors become distorted when you do not have a positive sense of self. Without that independent foundation, resentment, jealousy, feelings of manipulation, mistrust, and anger become the order of the day. It is not only unhealthy for the relationship, but also very unhealthy for the individual. This is an extremely stressful way to live. If emotions are not expressed in a healthy manner, all kinds of physical problems can result.

## Suspicion and Neediness in Relationships

Worry or anxiety in a relationship can lead to suspiciousness, impulsiveness, and neediness. The worry may cause individuals to doubt whether the other person really cares about them and, in turn, they are not able to trust. The worry may also be behind negative, impulsive actions that undermine the relationship. Neediness is a form of obsessive relating borne by fear of rejection or general worry about the relationship. The clinging behavior accompanying neediness may be suffocating to the other, bringing about anxiety for both people.

## Abusive Relationships

One of the saddest components of abusive relationships is that, over time, they tend to get worse instead of better. There are many forms of abuse, not just physical abuse. Emotional abuse can be just as harmful as physical abuse. An abuser is often very angry, has a very poor sense of self, and is not honest with himself or herself, nor with others. It is common to find control issues, threats, and withholding of emotion in abusive relationships. Often the abuser has been abused and the pattern is not changed.

Typically, moving into another relationship will not eliminate the abuse because it probably stems from within the individual more than from a particular relationship. Another insidious aspect of abusive relationships is that if one does try to remove themselves from the relationship, the abuser often becomes more abusive.

# Are You in an Abusive Relationship?

Everyone deserves to be in healthy relationships, and no one ever deserves to be abused. Listen to loved ones who are warning you that you are getting involved in a relationship that is not good for you. Be especially wise early in the relationship before you get emotionally entrenched, which is often a time when people do not use good judgment (*Figure 16*).

Some warning signs of a potentially abusive relationship include

- Possessiveness or jealousy
- Worry about how the other will react to what you do or say
- Pressures on you to behave in ways you do not want, especially sexually
- Being embarrassed or humiliated by the other via demeaning behavior
- Having difficulty ending the relationship



**Figure 16.** If you are intentionally and repeatedly humiliated by another person, you may be in an abusive relationship, even if no physical abuse occurs.

## Avoiding Responsibility

It's easy to fall into the trap of blaming someone or something for the way our lives are turning out. Covey maintains that responsibility is our ability to respond—response-ability. Responding with blame means that we actually feel we had no choice. This is certainly a difficult way to go through life and is why addictions are so insidious. Addictions, more than anything, tend to nullify our capacity to respond. Choice is always present. We can choose how we respond whether physically, emotionally, or mentally.

Being accountable for our actions will lead to personal happiness and positive relationships. "Owning" our feelings will result in expressing them with "I messages." Saying that "I feel this way" indicates you are responsible, whereas saying "you made me feel this way" communicates blame. Common phrases that people say when they are avoiding responsibility include

- I had no choice.
- That was out of my control.
- If you do, then I will.
- It's just the way I am.

Avoiding responsibility impacts negatively on relationships because it's basically a form of manipulating another, rather than genuine and honest relating.

Seek out healthy relationships by being in a healthy place yourself. The only person you can change is yourself. If change is needed, go about it gently. Believe in abundance. Life is good, and it is what you make of it.



**Figure 17.** Loneliness can be turned into a positive emotion when it prompts us to seek out other people and healthy, meaningful relationships.

## DEALING WITH LONELINESS

Up to now this chapter has focused on being part of meaningful, lasting relationships, but the truth is many of us have found ourselves at one time or another feeling as though we are alone. According to John T. Cacioppo, a social neuroscientist at the University of Chicago, loneliness is "one's own perceived social isolation." In other words, feeling isolated from others occurs even when a person is not isolated from others. If you do not feel connected to others—this sense of belonging we have discussed—you may be around others but still experience a powerful feeling of being alone.

Loneliness can actually be good for us depending on how we respond to the feeling. Cacioppo sees loneliness as a trigger similar to hunger. Hunger prompts us to eat and to maintain our health. Loneliness is a signal that protects us from isolation and prompts us to connect with others (*Figure 17*). Both triggers are necessary for our health and survival.

Cacioppo explains that the reason we prosper is because we are socially connected to each other. When we respond to the trigger of loneliness, we seek to connect with others. To overcome loneliness, the key is the quality of our connections and not the quantity. Many who live alone are perfectly happy and have strong social connections with others. When we respond immediately and volunteer to help someone or reach out to someone, loneliness has been a good trigger. When we fail to respond to that trigger, and experience long-term loneliness, then these feelings can lead to despair, depression, and illness.

Even though technology seems to be connecting us to many people, if the connections are superficial at best, we may feel lonely amid many social contacts. In a 1985 survey, people indicated that, on average, they had three people in whom they could confide. The survey was repeated in 2004 and 25 percent of the respondents said there was no one in whom they could confide. Researchers report that we have an epidemic of loneliness today with about 50 percent of the population feeling unhappily isolated.

Lonely people tend to have higher blood pressure, have poorer nutrition, produce more cortisol, and tend to be more hostile. Loneliness can strike anyone. If you are expecting a long-term relationship to protect you from loneliness, that may not be the case—loneliness can be experienced even by those in lasting relationships. It is healthy to view loneliness as a trigger and then respond in a way that results in quality social connections.

## Relating to a Higher Power

For many, relating to God or to a higher power is the bedrock of all their relationships (*Figure 18*). Examine your own beliefs to see if they possibly lead you in this direction. If so, explore what this means to you and the nature of this relationship. Can you make it stronger through your own actions? Do you feel comfortable praying? Do you achieve the same feeling through meditation?



**Figure 18.** Prayer, meditation, or some other form of connection with a Higher Power brings many a healthy sense of being loved and, ultimately, of the value of loving others.

To receive love is often more difficult than to give love. Having a strong connection with a higher power usually means we are desirous of, or willing to receive, love. This is a significant attribute for healthy relating. If we are not capable of or interested in receiving love, it is more than challenging to form quality relationships. Not being willing to receive love is often a sign of a person wanting to control rather than relate.

## A Prayer for Well-Being

St. Francis of Assisi lived in the 1100 and 1200s. He rejected material wealth and took on a life of poverty. This famous prayer attributed to him has lasted for centuries and is a source of encouragement and healthy relating for many people:

*Lord, make me an instrument of your peace,*

*Where there is hatred, let me sow love;*

*Where there is injury, pardon;*

*Where there is doubt, faith;*

*Where there is despair, hope;*

*Where there is darkness, light;*

*Where there is sadness, joy;*

*O Divine Master, grant that I may not so much seek to be consoled as to console; to be understood as to understand; to be loved as to love. For it is in giving that we receive; It is in pardoning that we are pardoned; And it is in dying that we are born to eternal life.*

This prayer emphasizes the giving of love. The balance of the giving and the receiving of love is the crux of healthy relationships. Many religions have similar prayers and beliefs with this same message. Being drawn to something higher than ourselves could help us all to fashion a healthier and more peaceful world.

## Relating to Your Environment

One of our significant relationships and one that we are in a good position to make positive is our relationship with the environment. Today, more than ever, people are experiencing a growing awareness of the natural connection between the wellness of a community and the wellness of the environment. *Green exercise* is basically any physical activity that takes place in nature such as gardening, hiking, boating, horseback riding, and kite flying. Many studies over the years have documented the physical and mental health benefits of green exercise and physical activity (*Figure 19*). Researchers in the United Kingdom found that just five minutes of activity in nature results in improved mood and mental health.



*Figure 19. Outdoor activities such as canoeing and bike riding are known to improve our physical and mental health.*

The British Trust for Conservation Volunteers (BTCV) and Oxford University professor Dr. William Bird worked together to formulate Green Gyms. The purpose of Green Gyms is to not only give people the benefits of being active in nature, but also to improve the community and the environment. It's like a Peace Corps for the environment. Participants work together for 1–4 hours digging, planting, clearing brush, and creating trails. Any number of conservation activities could be done that are within the strength and skill level of those taking part. Green Gyms are expanding rapidly beyond the United Kingdom.

## THE SCIENCE OF THE WHOLE INDIVIDUAL

# Putting Our Energy to Use

In Seattle, Adam Boesel has developed a green microgym. He connected spinning bikes to wind generator motors, which allows the cyclists to generate electricity to power the gym. Adam is hoping that his gym, Total Body Turnaround, with improved technology, will be completely powered by individuals working out.

ReRev is a commercial enterprise that has been retro-fitting gym equipment to take the kinetic motion of aerobic exercise and convert it to safe, renewable energy that feeds into the electrical system. Many of these systems have been installed in universities throughout the United States. Oregon State University (OSU) may have the largest human power plant in the world, according to ReRev Vice President Glen Johansen. Working together with ReRev, OSU converted 22 elliptical machines to use human energy to help run the Dixon Recreation Center's electrical system.

A study at Albion College, supported by the National Center for Environmental Research, analyzed the effectiveness of a similar program, Calories to Kilowatts (C2K). The results were so successful that additional studies have been conducted and programs are being introduced to benefit third world countries.

Some hotels are even providing free meals as incentives to guests to generate renewable energy in their fitness facilities. In the future, we can anticipate many more ways that the kinetic energy we produce as we engage in physical activity will be converted to renewable energy to improve the wellness of the environment, at the same time we work to improve our own wellness. This is a relationship worth working on!

## MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Learn to be a positive person.
2. Don't feel you have to go through life feeling helpless.
3. Acquire personality traits that will improve your immune system and help keep you healthy.
4. Find your passions and live life abundantly.
5. Give yourself fully to developing your talents and abilities and be a benefit to yourself and others.
6. Strive for quality long-term relationships.
7. Enjoy your relationship within your community and the environment.
8. Realize that it takes your whole being to have wholeness and balance in healthy relationships.
9. Give freely to others to find lasting happiness and peace.
10. Discover the joys of relating to a higher power or other realities that take you beyond your own cares and concerns.

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# GLOSSARY TERMS

**Assertiveness:** A communication style based on respect for self and others in which feelings and thoughts are expressed honestly and forthrightly.

**Attributional style:** A person's perceptions of success or failure; will affect motivation for future endeavors.

**Emotional resilience:** The ability to recover quickly from traumas due to illness or misfortune.

**Flow:** Extraordinary feelings accompanied by a lack of self-consciousness or awareness of time when fully engaged in an activity.

**Happiness:** Finding joy, contentment, pleasure, and meaning in life.

**Hardiness:** The capacity to deal successfully with stressful situations and turn adversities into advantages.

**Integrity:** Authentic, without pretense, sincere, taking responsibility for your feelings and actions.

**Learned helplessness:** Acquiring an outlook expecting failure and viewing the world and others in a negative light.

**Learned optimism:** Acquiring an outlook expecting positive outcomes and viewing the world and others in a positive light.

**Love:** Valuing and maintaining close relationships with others.

**Personality:** The physical, mental, emotional, and social characteristics of a person.

**Positive psychology:** Focus on mental health rather than mental illness, and on what people can do to foster greater happiness.

**Trust:** To rely on the integrity of a person and have confidence in them.

**Virtues:** Core values that have been universal for centuries and in various cultures.

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## Avoid Addictive Behaviors

# Could I Be Addicted?

Some writers label good, healthy habits as positive addictions—for example, someone might say they are addicted to running if they really like that form of exercise. But for the purposes of our discussion, we will define addiction as only negative. An addiction is any behavior someone feels compelled to continuously repeat, despite knowing it has destructive consequences to health or relationships, and sometimes even despite the desire of the addicted person to quit. Often it is something a person feels a need to lie about, cover up, or deny.

# CHAPTER OUTLINE

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Addictions are classified as either substance addictions or behavioral addictions. Overcoming an addiction requires an approach to changing the behavior that is different from simply changing a bad habit or striving to adopt a good one. The reason for this is the very nature of addiction itself.



## After reading this chapter, you will be able to:

- › **DEFINE** addiction and list examples of common addictions.
- › **USE** science to explain how people become addicted.
- › **DISCUSS** the relationship between addictions and brain development.
- › **DESCRIBE** the characteristics and effects of commonly abused substances, including alcohol, tobacco, and drugs.
- › **RECOGNIZE** common addictive processes or behaviors.
- › **DISCUSS** effective treatments to overcome addictions.



# Could I Be Addicted?

## avoid addictive behaviors

## WHAT IS ADDICTION?

Historically we have thought of **addiction** as a reliance on substances such as drugs, alcohol, or tobacco. Today it is widely recognized that processes or behaviors can be addictions as well. Normal behaviors such as eating, exercise, relationships, and sexual relations can sometimes become addictive. So, can other everyday activities such as shopping, watching television, using computers, or texting. Gambling or viewing pornography can also become compulsive behaviors. Since there are so many aspects of life that can turn into addictions, addictive behavior is something each person needs to understand and consider as a possibility in his or her own life.

A common aspect of addictions is their compulsion. A person feels powerless to avoid falling back to a destructive habit. Addictions have physical, psychological, and social effects—they negatively affect the whole person. With an addiction, we are engaging in behavior that is contrary to what we value. Even though it seems we want to be rid of the behavior, the need or craving the addiction fulfills leads us to do it more and more. But eventually, the longed-for high or euphoria that got the addict hooked on a certain substance or activity usually fades and leaves the person in the depths of despair. To be addicted is to be caught in a terrible turmoil.

If the individual is cut off from the addiction, there is a period of withdrawal. Because the addiction affects the whole person, there will be physical, mental, and psychological aspects to withdrawal. There is no peace with an addiction.

Not only are addictions potentially devastating and life-threatening to individuals, but they wreak havoc on society at large. According to government statistics, substance-abuse addictions alone cost the United States an estimated \$484 billion a year. Can you imagine the costs if the behavior or process addictions were added? Addictions are one of the most serious problems in our society (*Figure 1*).



**Figure 1.** According to the Centers for Disease Control, 10,228 people were killed in alcohol-impaired driving crashes, which is one-third of all traffic-related deaths in the United States.

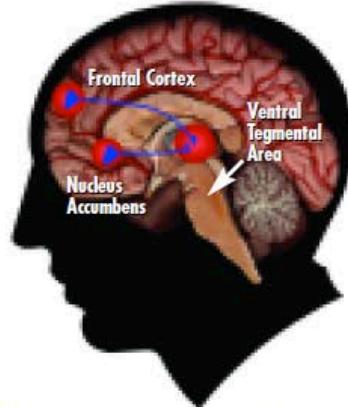
## THE SCIENCE OF ADDICTION

For hundreds of years, doctors have studied the physiological and biochemical processes involved in addiction. The *biomedical model* gives us insight into the chemistry of addiction and the genetic factors that come into play regarding whether something becomes an addiction. This is one reason our understanding of addictions has historically been confined to people's reliance on substances.

In 1977, Dr. George Engel, a psychiatrist at the University of Rochester, called for a new medical model that recognized psychological and social factors in addictive problems. The *biopsychosocial perspective* gives us insight into personality factors, family, and relationship dynamics, and environmental issues found in the lives of addicts. While no specific model was developed, many medical professionals are now viewing addictive problems from this biopsychosocial perspective.

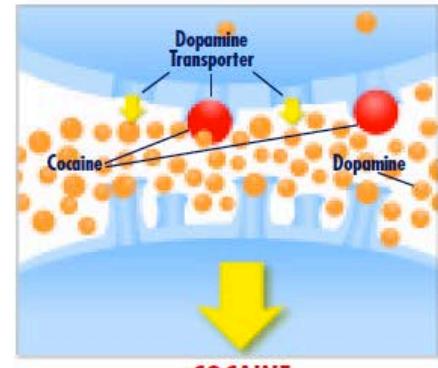
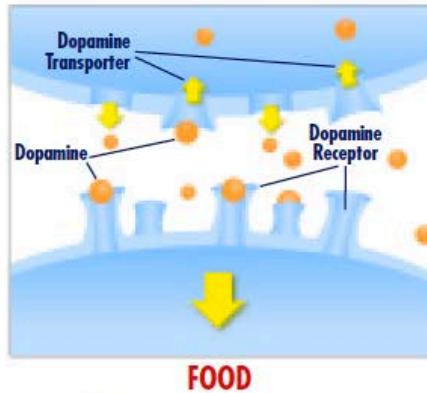
### DRUGS OF ABUSE TARGET THE BRAIN'S PLEASURE CENTER

#### Brain reward (dopamine) pathways



These brain circuits are important for natural rewards such as food, music, and sex.

#### Drugs of abuse increase dopamine



Typically, dopamine increases in response to natural rewards such as food. When cocaine is taken, dopamine increases are exaggerated, and communication is altered.

**Figure 2.** The brain's reward pathway is altered by addictions.

**Source:** National Institutes of Health: National Institute on Drug Abuse.

# The Chemistry of Addiction

In the past decade brain research significantly advanced our understanding of the addictive process. A central feature of addictive brain activity is the reward pathway that is stimulated by addictive substances or behaviors.

## Mesolimbic Dopamine System

This circuitry is found in the mesolimbic dopamine system (*Figure 2*). Structurally, it begins with the **ventral tegmental area (VTA)** located near the floor of the midbrain. The nerve cells in the VTA release the neurotransmitter **dopamine**, which stimulates receptors on neurons of the **nucleus accumbens (NAcc)**, a structure located beneath the frontal cortex. The flood of dopamine into this brain pathway causes the feeling of a *high*—a strong reward message. Continued stimulation of this circuitry results in adaptations in the brain that give rise to various stages of addiction. This pathway has been observed utilizing functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) scans.



**Figure 3.** The effects of addiction on the brain are the same regardless of the type of addiction.

One of the fascinating aspects of these findings is that no matter the nature of the addictive behavior or substance, there is a common response via this dopamine reward circuitry. For example, this means that repeatedly viewing pornography creates a similar brain response as taking heroin (*Figure 3*).

## Brain Adaptations to Addiction Cause Dependence

One of the brain adaptations caused by addiction actually reduces the formulation and communication of dopamine, thereby lessening the high feeling. When the brain's reward pathway is activated repeatedly from a certain behavior, the resulting oversupply of dopamine signals the brain to down-regulate the production of the neurotransmitter. It also responds by reducing the number of dopamine receptors in the NAcc, which in turn leads to decreased reward pathway completion. This leaves the person feeling depressed, flat, and unhappy. The individual ends up needing more of their addictive substance or behavior to bring dopamine levels up to their normal state. This adaptation creates a tolerance for the drug or stimulus, thus requiring more of it to create the hoped-for response. These adaptations create a dependence on the drug or stimulus.

## Addictions Shortcut the Reward Pathway

Nestler and Malenka observed the creation of additional dendritic spines on the receptors of the NAcc neurons. These enhance their communication with other neurons, thus involving many more structures of the brain than those directly composing the reward pathway. These additional brain structures are usually the same circuits involved with memory, learning, and decision making, so the brain remembers the high of the reward pathway. The normal functioning of the reward pathway usually requires a concerted effort, after which the response is delayed.

But addictive substances and behaviors are essentially a “shortcut” to the reward. The memory of this shortcut tends to alter the normal reward pathway, creating a craving just for that stimulus. Initially, the reward pathway elicits feelings of pleasure, but with the adaptations, that pleasurable feeling may no longer be present, yet the individual continues to crave the stimulus. Additional thought processes are impaired through the involvement of another excitatory neurotransmitter, glutamate. This further complicates breaking an addiction.

## Relapse and Long-Term Consequences of Addiction

Relapse into addictive behaviors can occur long after a person has eliminated the substance or behavior from their lives. Nora Volkow, M.D., director of the National Institute on Drug Abuse, has discovered more sophisticated aspects of addiction beyond the dynamics of the reward pathway. As reported in the *Psychiatric News* of the American Psychiatric Association, “What has evolved is a picture of multiple regions of the brain being progressively compromised—the anterior cingulate gyrus, which governs attention and regulation of impulsivity; the orbital prefrontal cortex, which mediates the assignment of value to stimuli in the environment; and the dorsal lateral prefrontal cortex, which governs executive function and decision making.”

These parts of the brain work together to normalize brain functioning even in the presence of the addictive stimuli. With continued stimulation, these processes begin to deteriorate, and the brain is significantly altered. Both the structure and the function of the brain are being destroyed.

Volkow focuses on saliency—what the brain perceives as important or salient. Normal behavior elicits a normal dopamine response. Addictive behaviors elicit an extraordinary response—supraphysiological—which leads to the breakdown of normal brain functioning. With the damage to the prefrontal cortex, stimuli other than the substance itself can cause a flood of dopamine release. Volkow reported her research in which cocaine users experienced increases in dopamine and reported cravings for cocaine when simply watching a video of cocaine users.

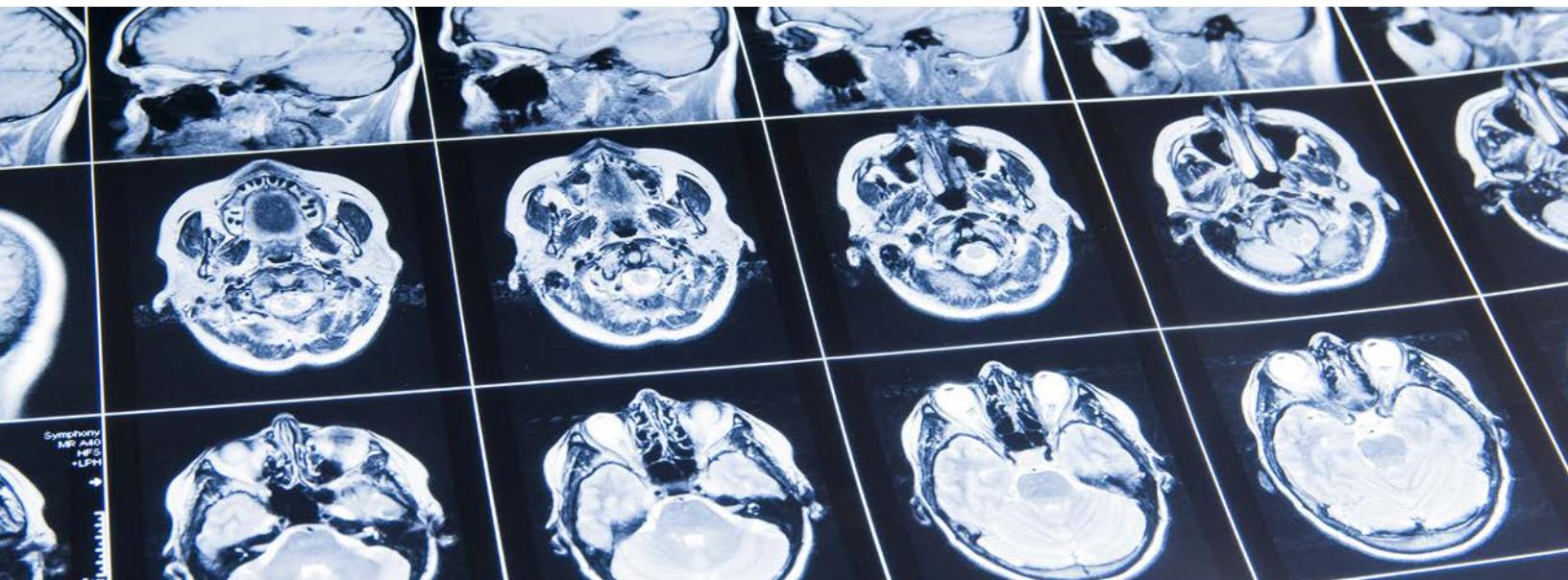
With the alteration of prefrontal cortex functioning, the brain no longer discriminates what is important for normal living. Decision making is greatly impaired. Rita Z. Goldstein, Ph.D., and her associates conducted a study of those with cocaine-use disorders to better understand what they term the *Impaired Response Inhibition and Salience Attribution (I-RISA)*. This model analyzes the addicted person’s ability to place importance on normal functions such as social relations and eating, as opposed to placing excessive importance on drugs. Measuring brain activity with the fMRI, Goldstein reported that when 16 subjects were asked to rate the value of 7 different amounts of money ranging from \$10 to \$1,000 on a scale from 1 to 10, 56 percent of them rated \$10 to be equally valuable with \$1,000. The brain activity in the prefrontal cortex accounted for 85 percent of the variability in the subjects’ inability to discern the value of the money (*Figure 4*).



**Figure 4.** Addictive behaviors impair your brain's decision-making power, which can leave you empty handed.

## Addiction and Brain Development

Neuroscience as a field is only about 50 years old. Our understanding of the brain has increased dramatically in this time. Previously scientists thought that the brain was fully developed in young children. Through brain imaging, we now know that development of the prefrontal cortex—the part of the brain that controls complex decision making—continues into a person's 20s, possibly until age 24, as connections continue to form between reasoning and emotion areas of the brain (*Figure 5*). That means the places of cognitive or reasoning functions that involve impulses and emotions are some of the last areas of the brain to mature.



**Figure 5.** The brain area that controls complex decision making does not fully develop until a person is well into their 20s.

## Brain Plasticity

Brain plasticity is the ability of the brain to rewire its connections in response to learning and experience. It is heightened during the adolescent and early adult years. This heightened ability to learn also heightens one's response to addictive substances. The potential addiction could be considered a form of learning. Meanwhile, without having a fully developed prefrontal cortex, there is less maturity in terms of judgment or self-inhibition of someone in this sensitive age range.

## Young Brains Are Particularly Vulnerable to Addiction

Research by psychologists Heather Brenhouse, Ph.D., and Susan Andersen, Ph.D., at Harvard's McLean Hospital found that "teenagers may form stronger-held addictions, have a tougher time quitting drugs, and be more susceptible to relapse once they have quit."

Because of this continuing brain development, individuals in their teens and early twenties are especially vulnerable to brain damage caused by various addictions and addictive substances. Neuroscientists have also discovered that the ventral striatum which includes the NAcc is more active in individuals during those years. This is another reason the younger adult brain is more susceptible to being negatively affected by harmful substances.

## Genetic Effects

Research on susceptible families suggests that there are complex genetic and environmental factors involved in the addictive process. University of Utah scientists compared the DNA of individuals with addictions to the DNA of non-addicted individuals. They found that the A1 allele of the dopamine receptor gene DRD2 is more common in people addicted to alcohol or cocaine. If susceptible individuals could be recognized early, interventions could be targeted to this vulnerable population.

Having a certain gene does not cause a person to become an addict or engage in addictive behaviors. It just means that the person will be more susceptible to addictive behaviors than people without the gene. With greater understanding, we can help all persons live with a heightened sense of responsibility and accountability.

## Personality Factors

Addictive thinking and behaviors are apparent, but it is generally agreed that there is no one conclusive addictive personality profile that fits every addict. One of the difficulties in formulating such a profile is the unique manner in which individuals are influenced by addictive substances and processes. Even though the reward pathway is identifiable as a common mechanism of physical response, each individual is likely to have an experience unlike other people.

Studying the personal history of those being treated for addictions lends some insight into possible contributing factors. Substance abuse is facilitated by one's environment. Children who have parents who abuse substances are more likely to do the same. National Institute on Drug Abuse (NIDA) data indicate that currently, one in four people under the age of 18 have parents who drink heavily or use drugs. Many people with addictions have been abused as children.

We know that about as many women as men are smokers, but women report more often than men that they smoke to be able to deal with emotional stress.

Thinking in a mind manner, researchers have conducted numerous studies that demonstrate a definite link between addictive problems and personality. These are some attitudes and behaviors that may make us susceptible to addictions:

- **ANXIETY:** Prone to various fears; seems to be exaggerated in those with addictions; possibly generalized as in free-floating anxiety.
- **IMPULSIVENESS:** A heightened sense of impatience, particularly with people or situations that make us frustrated or uncomfortable; difficult to stay with a task or experience; the need for immediate gratification or "quick fix."

- **SELF-CENTERED:** Arises out of a poor sense of self and low self-esteem; everything is for me or against me; it's all about me; arrogance.
- **OBSSESSED WITH IMAGE:** An extreme need for approval; extraordinary fear of rejection; tendency to censor oneself.
- **DEPENDENCY:** Rely on relationships to meet emotional, psychological, physical needs; personally insecure.
- **DENIAL:** Dishonesty; not able to admit one's weaknesses; a false sense of what is responsible, independent behavior; "no problems."
- **JUSTIFICATION:** Justify what we think is okay to feed our addictions; make assumptions and rationalize behavior.
- **PSEUDO-PLEASURE:** The addiction does not provide real pleasure or satisfaction; trouble with intimacy; difficult to find joy in normal living; sensation seeker; high-risk taker.
- **NEGATIVE CONTROL:** Relationships steeped in control issues, either controlling another or being controlled; tend to believe we can control our self and our own life with a substance or behavior.
- **DEPRESSION:** Often results from the feeling we cannot control our lives—which we had unrealistically assumed we could do; negative thinking; tendency to give up; buried under negative stress.
- **PERFECTIONISM:** Expectation to be perfect, which is impossible to accomplish; think we are never good enough or never do enough; not allowed to make mistakes; reprimand self (and others) for falling short.

Many believe that addictions essentially result from individuals trying to avoid having to deal with problems they face (*Figure 6*). Yet, there are potential strong points in many of the behaviors enumerated here. If the underlying idealism and passion could be tapped from a more stable stance, several of these negative attributes may be turned into positive ones.



**Figure 6.** Certain attitudes and behaviors can make us more susceptible to addiction, including depression, anxiety, impulsiveness, perfectionism, and others.

# COMMONLY ABUSED SUBSTANCES

Drugs that alter brain function, affecting changes in mood, perception, alertness, and behavior are called *psychoactive drugs*. They act on the central nervous system and cause various physical and psychological effects, depending on the drug. Because they are mood altering, these drugs tend to be commonly abused. Their excessive use often leads to an addiction.

## Drug Addiction Is a Brain Disease

The National Institute on Drug Abuse defines drug addiction as a brain disease because drugs change the brain. Drugs alter the functioning of the brain as well as its structure. These changes in the brain, particularly if they occur in the still-developing brains of those under 24 years of age, can seriously disrupt behavior and become long-lasting. How drugs affect a person and how effective is his or her recovery is extremely individualistic. All factors that affect the individual, including relationships and environment, can play a role in how quickly and seriously drugs harm a person and disrupt his or her life. There are treatments to help diminish the impact on the diseased portions of the brain.

Because drugs produce a euphoric feeling, people use and abuse them to seek to feel good, to experience “the high.” Some think that drugs will help them perform better in various situations. Many people are just curious and tempted to try drugs because of the influence of those around them. Because drugs affect people differently, it’s foolish to think it possible for anyone to control their use of drugs. When subjecting yourself to highly addictive substances, it is possible to become addicted with very little use of the drugs. It really is like playing with dynamite—damage is certain.

Smoking, inhaling, or injecting a drug into a vein increases the potential for addiction. With these methods, the drug reaches the brain in seconds, the high is immediate, and it may also recede quickly. The contrast of the high and then the low often drives the user to repeat the drug abuse to sustain the high (*Figure 7*).



**Figure 7.** Smoking or injecting a drug increases the potential for addiction because the drug reaches the brain very quickly, producing an immediate high.

# Drug Classifications and Effects

**Table 1** describes the most often abused drugs, their classification, and effects. *Club drugs* are those used at concerts, parties, bars, clubs, and so on, thus the name. Club or designer drugs may be particularly harmful because of the unsafe processes used to manufacture these drugs. Prescription drugs are also a common source for abuse of drugs. There may be a misperception that prescription drugs are not as harmful because they were prescribed for the purpose of helping someone. However, if abused, prescription drugs can cause brain problems, heart problems, and possibly mental problems. Steroids mimic testosterone and other hormones. When abused, steroids are known to cause cancer and sterility. All drug abuse is destructive of the whole person and potentially fatal.

**Table 1. Commonly Abused Drugs and Their Effects**

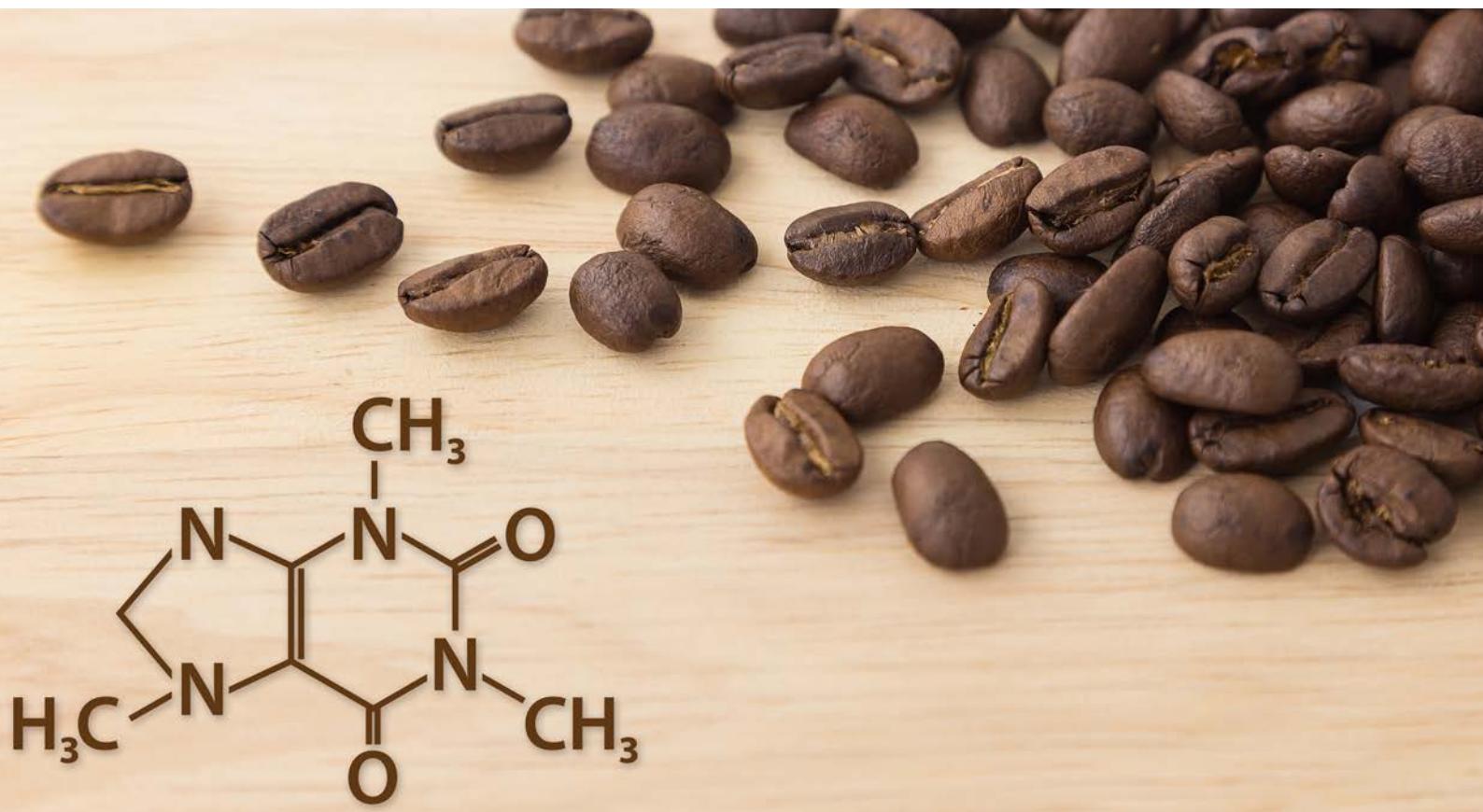
DRUG NAME	COMMON DESCRIPTIONS	EFFECTS	RISKS
Nicotine	Cigarettes, cigars, and smokeless tobacco	Increased blood pressure and heart rate	Chronic lung disease; cardiovascular disease; stroke; cancers of the mouth, pharynx, larynx, esophagus, stomach, pancreas, cervix, kidney, bladder, and acute myeloid leukemia; adverse pregnancy outcomes; addiction
Alcohol	Liquor, beer, and wine	Drowsiness, slurred speech, nausea, emotional volatility, loss of coordination, visual distortions, impaired memory, sexual dysfunction, loss of consciousness	Increased risk of injuries, violence, fetal damage (in pregnant women); depression; neurologic deficits; hypertension; liver and heart disease; addiction; fatal overdose
Marijuana	Blunt, dope, ganja, grass, herb, joint, bud, Mary Jane, pot, reefer, green, trees, smoke, skunk, weed	Euphoria; relaxation; slowed reaction time; distorted sensory perception; impaired balance and coordination; increased heart rate and appetite; impaired learning, memory; anxiety; panic attacks; psychosis	Cough, frequent respiratory infections; possible mental health decline; addiction
Heroin	Diacetylmorphine: smack, horse, brown sugar, dope, H, junk, skunk, white horse, China white; cheese	Euphoria; drowsiness; impaired coordination; dizziness; confusion; nausea; sedation; feeling of heaviness in the body; slowed or arrested breathing	Constipation; endocarditis; hepatitis; HIV; addiction; fatal overdose
Cocaine	Cocaine hydrochloride: blow, bump, C, candy, Charlie, coke, crack, flake, rock, snow, toot	Increased heart rate, blood pressure, body temperature, metabolism; feelings of exhilaration; increased energy, mental alertness; tremors; reduced appetite; irritability; anxiety; panic; paranoia; violent behavior; psychosis	Weight loss, insomnia; cardiac or cardiovascular complications; stroke; seizures; addiction
Methamphetamine	Desoxyn: meth, ice, crank, chalk, crystal, fire, glass, go fast, speed	Increased heart rate, blood pressure, body temperature, metabolism; feelings of exhilaration; increased energy, mental alertness; tremors; reduced appetite; irritability; anxiety; panic; paranoia; violent behavior; psychosis	Weight loss, insomnia; cardiac or cardiovascular complications; stroke; seizures; addiction

**Source:** National Institute on Drug Abuse.

# Caffeine

Caffeine is the most widely used stimulant in the world. According to the Centers for Disease Control (CDC), 80–90 percent of North Americans report regular use of caffeine, with an average daily intake of caffeine in the United States of about 300 milligrams. Ingesting excessive amounts of caffeine can result in an addiction termed *caffeinism*. About 10 percent of the adult population experience caffeinism, resulting in psychological and physiological difficulties. The Johns Hopkins summary of 57 experimental studies and 9 survey studies on caffeine withdrawal indicates that people may develop caffeine addiction with as little as one standard cup of coffee a day. Five common withdrawal symptoms include headache, fatigue, drowsiness, irritability, and difficulty concentrating. Some even experience nausea, vomiting, and muscle pain. Usually, symptoms arise 12–24 hours after the last dose of caffeine, with the worst of the withdrawal symptoms occurring in the first few days after ceasing to use caffeine.

Caffeine is an alkaloid that acts as a mild psychoactive stimulant and a mild diuretic, which means it increases the volume and rate of urination (*Figure 8*). Caffeine acts as a natural pesticide in over 60 different plants that produce it in their beans, leaves, and fruit. Most caffeine is consumed in beverages such as coffee, tea, soft drinks, and energy drinks. A lesser amount is found in chocolate.



**Figure 8.** Caffeine is an organic molecule that acts as a mild psychoactive stimulant and a mild diuretic.

Energy drinks pose a problem regarding caffeine consumption. More than half of those drinking energy drinks are under 35 years of age. The seeds of the South American guarana plant—containing about 3–4 times as much caffeine as coffee beans—are the caffeine source used to make energy drinks. Medical professionals estimate that consuming more than 600 milligrams of caffeine a day poses health problems. Some energy drinks may contain up to 400 milligrams in a 16-ounce drink. A risky activity in the United States and other countries is combining alcohol with energy drinks (*Figure 9*). It is estimated that the energy drink market in the United States is over \$10 billion in sales.



**Figure 9.** Consuming more than 600 milligrams of caffeine per day poses health problems. Some energy drinks contain up to 400 milligrams in just one 16-ounce drink. **Editorial credit:** Billion Photos / Shutterstock.com

Caffeine affects people differently depending on a person's age, height, weight, and gender. Basically, it stimulates the central nervous system increasing heart rate, blood flow, and metabolic rate. Excessive use can result in anxiety, nervousness, upset stomach, and insomnia. Excessive use has also been attributed to miscarriage, low-birth-weight, and delayed conception.

## Alcohol

In the general adult population of the United States, 35 percent do not drink any alcohol. About 43 percent are occasional to moderate drinkers, and the remaining 22 percent are considered heavy drinkers with a minimum of two drinks per day. The legal minimum drinking age of 21 was established nationally in 1984.

The reason for setting the drinking age at 21 rather than 18—the age at which people are legally viewed as adults—originally had more to do with traffic fatality statistics than it did with hard science. But studies have since shown that there are sound health reasons to restrict drinking in young adults. For example, adults who spend years using alcohol heavily have smaller brain sizes than normal, particularly in the prefrontal cortex, thalamus, and the cerebellar hemispheres. These are the same regions of the brain that are not fully developed until someone reaches age 24.

A damaged or underdeveloped prefrontal cortex could mean limitations in the capacity to think, reason, make decisions, use good judgment, and control impulses. Alcohol also negatively affects the hippocampus in the developing brain, which could impair learning and memory. As neuroscientists continue to study how the brain matures and develops during adolescence and young adulthood, it is possible that even more consequences of youthful heavy drinking are yet to be discovered.

## Intoxication and Blood Alcohol Level

According to the U.S. Centers for Disease Control and Prevention (CDC), a standard drink contains about half an ounce of pure alcohol, equivalent to 13.7 grams or 1.2 tablespoons.

This amount of pure alcohol is found in:

- 12 ounces of regular beer or wine cooler
- 8 ounces of malt liquor
- 5 ounces of wine
- 1.5 ounces of 80-proof distilled spirits or liquor such as gin, rum, vodka, whiskey

An 80-proof drink is 40 percent alcohol—the proof of a drink is twice the percentage of alcohol in the drink. **Ethyl alcohol**, also known as grain alcohol or ethanol, is the psychoactive intoxicating substance in all alcoholic drinks. It is a colorless, pungent liquid. A standard drink, as described above, represents the concentration of ethyl alcohol in the beverage.

**Table 2. Behaviors Associated with BAC Levels**

BAC LEVEL	BEHAVIOR
.08%	You think you are functioning well, but you begin to lose balance and slur speech. Behaviors include exaggerated speech and bolder actions. Decision making becomes impaired, including sexual situations.
.10% – .12%	You may feel euphoric, but your balance and coordination are increasingly impaired. You may become more emotional, and some people become aggressive.
.14% – .17%	At this level, it is more difficult to talk coherently or walk in a straight line. Judgment is severely impaired and there is an increased risk of injury to yourself or those around you.
.20%	You are disoriented and confused, and your friends may need to help you walk. Nausea and vomiting are common at this level, but your gag reflex is likely to be impaired. There is a risk you will black out and choke on your own vomit.
.25%	You're severely mentally, physically, and emotionally impaired. You are likely to fall and hurt yourself, choke on your vomit, or hurt others.
.30%	You are in a stupor. You will likely pass out, if you haven't already, and your friends will have difficulty waking you up.
.35%	This is similar to being under surgical anesthesia, and you may stop breathing. You can't help yourself at this point. Are there people around aware of your situation and clear-headed enough to get you to a hospital?
.40%	You are in a coma and will probably die.

**Source:** Barnard College, Columbia University.

## Blood Alcohol Concentration (BAC)

**Blood alcohol concentration (BAC)** is the level of alcohol in a person's bloodstream, which determines the effect the alcohol has on a person. Alcohol is absorbed slowly into the bloodstream through the stomach, and then more quickly through the small intestine. Once in the bloodstream, the alcohol can affect every system of the body (**Table 2**). The liver is mainly responsible for alcohol metabolism. It neutralizes and breaks down the alcohol at the rate of about half a drink per hour.

Body weight, amount of body fat, and heredity can affect blood alcohol concentrations. Women have less active alcohol-metabolizing stomach enzymes, are usually smaller than men, and have a greater percentage of body fat than men. All these factors mean that women usually take longer to metabolize alcohol than men, therefore women can develop a higher BAC than a man from the same amount of ingested alcohol. The presence of food in the stomach, particularly fatty foods, will slow down the absorption of alcohol. Inexperienced drinkers who have not developed a tolerance to alcohol will be more quickly under the influence of alcohol than people who drink more frequently.



**Figure 10.** A Breathalyzer test is commonly used to determine a person's BAC because the level of alcohol in the breath is directly related to the alcohol level in the blood.

## Amount and Type of Alcohol Affects BAC

BAC is directly related to the amount and kind of alcohol consumed. Beer and wine are absorbed more slowly than distilled spirits. Diluting liquor with water also slows absorption. Carbonated beverages speed absorption, one of the main concerns with adding liquor to energy drinks. The rate at which a person drinks alcohol also shapes their BAC. If alcohol is consumed but not metabolized, the BAC will rise. Alcohol poisoning, which can be lethal, results from drinking large amounts of alcohol in a short period of time, thus quickly raising the BAC until the alcohol can be metabolized.

BAC is expressed as a percentage. Having a BAC of 0.08 indicates 8 parts of alcohol per 1,000 parts of blood. State laws work with grams of alcohol per 100 deciliters of blood (grams per deciliter or g/dl). Breath, blood, or urine tests are used to measure BAC levels (**Figure 10**). The BAC level most states recognize as legally drunk is 0.08 percent. Laws establishing much lower BAC levels for drivers under the legal drinking age of 21 are called zero-tolerance laws or per se law. This makes the drinking itself a violation and convictions more likely. Some states have BAC limits for those under 21 as low as 0.01 or 0.02 g/dl. Table 2 gives behaviors associated with different BAC levels.

## Alcoholism

**Alcoholism**, also known as alcohol dependence, is a disease that includes four symptoms, according to the U.S. Substance Abuse and Mental Health Services.

1. **CRAVING.** A strong need or compulsion to drink.
2. **LOSS OF CONTROL.** The inability to limit one's drinking on any given occasion.
3. **PHYSICAL DEPENDENCE.** Withdrawal symptoms occur when alcohol use is stopped after a period of heavy drinking: nausea, sweating, shakiness, anxiety.
4. **TOLERANCE.** The need to drink greater amounts of alcohol to get high.

The National Council on Alcoholism and Drug Dependence along with the American Society of Addiction Medicine define alcoholism as a primary chronic disease with genetic, psychosocial, and environmental factors influencing its development and manifestations. The disease is often progressive and fatal. Fifty percent of trauma beds in U.S hospitals are occupied by people injured when they were under the influence of alcohol because their judgment or motor abilities were impaired. Alcoholics cannot simply "will" themselves to not drink. The need to drink alcohol can be as powerful as the need for people to drink water or to eat.

According to Mothers Against Drunk Driving (MADD), an estimated 17,600 people die each year in traffic accidents involving alcohol. MADD also estimates that 3 in every 10 Americans will be involved in an auto accident involving alcohol at some point in their lives. Approximately two-thirds of spousal or intimate partner abuse are alcohol-related (*Figure 11*). People with alcohol problems abuse nearly 500,000 children in their care each year.



**Figure 11.** Roughly two-thirds of domestic abuse cases are alcohol-related.

About 7.4 percent of the American population—approximately 14 million people—are alcohol dependent. More than half of American adults have had a close family member who has had alcoholism. Almost one in four children under the age of 18 are exposed to alcohol abuse or dependence in the family (*Figure 12*).



**Figure 12.** Nearly 25 percent of children under age 18 are exposed to alcohol abuse or dependence within their families

Alcohol detoxification is the sudden elimination of alcohol, which throws an alcoholic into withdrawal. Sometimes drugs are given to lessen the traumatic withdrawal effects and ease the person off of alcohol. This process treats the physical symptoms of alcoholism but will not eliminate the alcoholism—further treatment is needed to address the root cause of the alcoholism. Various medications have been prescribed for the treatment of alcoholism. Other treatments strive to uncover the psychological, social, and/or environmental factors in the person's disease.

## Fetal Alcohol Syndrome

The Mayo Clinic explains that **fetal alcohol syndrome (FAS)** is not a single birth defect. It is a cluster of problems with severe consequences that result from the mother drinking heavily while pregnant. Collectively, considering all the associated disorders, it is known as **fetal alcohol spectrum disorders (FASD)**. The signs may include:

- Distinctive facial features including small eyes, an exceptionally thin upper lip, a short-upturned nose, and a smooth skin surface between the nose and upper lip.
- Heart defects.
- Deformities of joints, limbs, and fingers.
- Slow physical growth before and after birth.
- Vision difficulties or hearing problems.
- Small head circumference and brain size (microcephaly).
- Intellectual disability and delayed development.
- Abnormal behavior such as a short attention span, hyperactivity, poor impulse control, extreme nervousness, and anxiety.

If you are a woman who does have a problem with alcohol, get help so that you can avoid any risk of FASD. This is one cause of intellectual disability that can be completely avoided.

## College Drinking Culture

In 1998, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) commissioned a Task Force on College Drinking to try to change the college drinking “culture” and reduce the destruction of lives and property due to college drinking. The Task Force, which reflects the thinking of all members of the campus community—students, professors, administrators, and parents—sees the culture of college drinking as “antithetical to the culture of learning, which is the core of higher education.” As the information in the report clearly demonstrates, the fallout from excessive alcohol consumption does not discriminate—it threatens the health and safety of all students, disrupts the academic process, frustrates faculty, and disturbs the lives of those in adjacent communities.

According to the report, 18–24 year-old college students experience the following due to alcohol use:

- 1,519 deaths from alcohol-related injuries, including motor vehicle crashes
- 599,000 accidental injuries while under the influence of alcohol
- 696,000 assaults by another student who has been drinking
- 1 of 5 women experience sexual assaults or date rape

The report further states that one in four students say that drinking had negative consequences on their academic performance. About one-third of students met the medical criteria for alcohol abuser, while about 6 percent met the criteria for alcohol-dependent. Clearly, this is a massive problem on college campuses today.

## Task Force on College Drinking

Over many years of trying to deal with the problems associated with drinking in college, many administrators have felt the problems are almost insurmountable. The Task Force on College Drinking has been able to mobilize administrators, students, and scientists to devise effective ways to change the current college drinking culture. Researchers developed their latest prevention program, College AIM, the College Alcohol Intervention Matrix. It is a comprehensive booklet and website to help colleges identify effective interventions ([collegedrinkingprevention.gov](http://collegedrinkingprevention.gov)). It involves comprehensive integrated programs with multiple complementary components that target the student population as a whole, the surrounding community, and individual students who are at risk or alcohol-dependent drinkers already.

Each college and each campus is unique and will need to do research to develop its own strategy. The Task Force has given a framework that is offering new hope for reducing the negative consequences of drinking by changing the college campus culture of drinking. Here is an opportunity to express your own healthy lifestyle choice and be a part of the solution rather than the problem.

## Tobacco

Taking a 21st-century approach to wellness, it would not be a difficult decision to include avoidance of tobacco use as very important for good health. For over 40 years the government has been warning Americans not to use tobacco in any form. All forms of tobacco contain **nicotine**, one of the most highly addictive psychoactive drugs.

Tobacco use is America’s leading cause of preventable death. According to the CDC website, 500,000 people die directly from smoking or exposure to secondhand smoke, and another 16 million have a serious illness caused by smoking. The CDC also reports that despite these risks, approximately 40 million U.S. adults smoke cigarettes. Coupled with the enormous health toll is the significant economic burden of tobacco use. In the United States, tobacco-related disease costs more than \$225 billion per year in medical expenditures.

# Binge Drinking on Campus

Much college-age alcohol abuse takes the form of **binge drinking** which is defined as five or more drinks in a row for men, and four or more drinks in a row for women—the so-called 5/4 definition. Several national surveys indicate that about four out of five college students drink, and about half of those engage in binge drinking (**Figure 13**).

Binge drinking varies widely from campus-to-campus, with some reporting as few as 1 percent involved, and others finding that up to 70 percent of students binge drink. Statistics may give the impression that most college students are frequent binge drinkers. However, a closer look by the NIAAA shows that 70 percent of all alcohol consumed is done by 20 percent of the students. Recent studies show that 19 percent of students say they do not drink at all. This number of alcohol abstainers has risen in the past decade.

Many factors influence the drinking habits of students. Up to 30 percent of high school seniors report binge drinking in high school. NIAAA reports that excessive alcohol consumption is generally found at colleges and universities that include fraternities and sororities, at schools with prominent sports teams, and at universities and colleges located in the northeastern United States.



**Figure 13.** Binge drinking is a problem on many college campuses.

Nearly 75 percent of users begin smoking when they are teens, the time when the developing brain is more susceptible to addictions (*Figure 14*). In spite of scientific and medical evidence, people overlook the highly addictive nature of nicotine. Today approximately 2.55 million middle and high school students use at least one tobacco product including e-cigarettes. Each day about 1,600 youth try their first cigarette. The smoking habit today is expensive, costing the average smoker around \$4,690 a year. Smoking leads to less productivity on the job and higher rates of insurance. Birth defects attributed to a woman's use of tobacco while she is pregnant include lower birth weight, breathing problems, and possible childhood cancers. Cigarettes (both domestic and imported), cigars, pipes, smokeless tobacco, and snuff all contain addictive levels of nicotine. Various cancers accompany prolonged tobacco use of all kinds.

Concerted efforts and millions of dollars are spent each year on curbing tobacco use in the United States. It definitely is possible to eliminate this addiction individually, and hopefully, we will continue as a nation to work to eliminate smoking and all tobacco use.



**Figure 14.** Nearly 75 percent of smokers begin smoking in their teens, an age when the brain is still developing and more susceptible to addictive substances and behaviors.

## Opioids

According to the CDC, opioid overdose deaths have taken place in three waves:

1. The first wave occurred in the 1990s due to a rise in numbers of opioids being prescribed by doctors.
2. The second wave began in 2010 with rapid increases in numbers of deaths due to heroin.
3. The third wave began in 2013 with the rise in synthetic opioids, mainly fentanyl.

The CDC website reports that the number of drug overdose deaths increased by nearly 30% from 2019 to 2020 and has quintupled since 1999. Nearly 75% of the 91,799 drug overdose deaths in 2020 involved an opioid. From 2019 to 2020, there were significant changes in opioid-involved death rates:

- Opioid-involved death rates increased by 38%.
- Prescription opioid-involved death rates increased by 17%.
- Heroin-involved death rates decreased by 7%.
- Synthetic opioid-involved death rates (excluding methadone) increased by 56%."

Many government agencies are working with local and state public health officials, community organizations, and law enforcement to combat this growing epidemic. Doctors, universities, and community advocates are working tirelessly to curb this problem.

# COMMON ADDICTION OR DYSFUNCTIONAL BEHAVIORS

Not every addiction revolves around the abuse of a substance like drugs or alcohol. Behavior addictions have often been overlooked because of the focus on substance addictions. Depending on the activity in question, these behaviors can prove just as destructive, all-consuming, and difficult to quit as substance addictions.

## Gambling

Since the 1980s and 1990s, gambling has been legalized in 48 of the 50 U.S. states. As expected, increased legalization and availability has led to increased gambling. Taken to the extreme, problematic or addictive gambling can destroy people's lives and that of their families. In addition to the financial ruin often experienced, suicide rates among those with a gambling addiction are 20 times higher than the general population. The American Psychological Association (APA) defines pathological gambling as an impulse control disorder that is a chronic and progressive mental illness.

Approximately 2–5 percent of the general population are considered addicted or problematic gamblers. Of great concern is that the rate among college-age students is more than double this figure, with up to 9 percent having some sort of gambling-related problem (*Figure 15*). Other reports indicate that men are much more likely than women to have a gambling problem, with only 2 percent of college-age female students having some sort of issue with gambling. A much higher percentage of problem and compulsive gambling occurs with online gambling than with other forms. The recent pandemic restrictions have resulted in more people gambling.

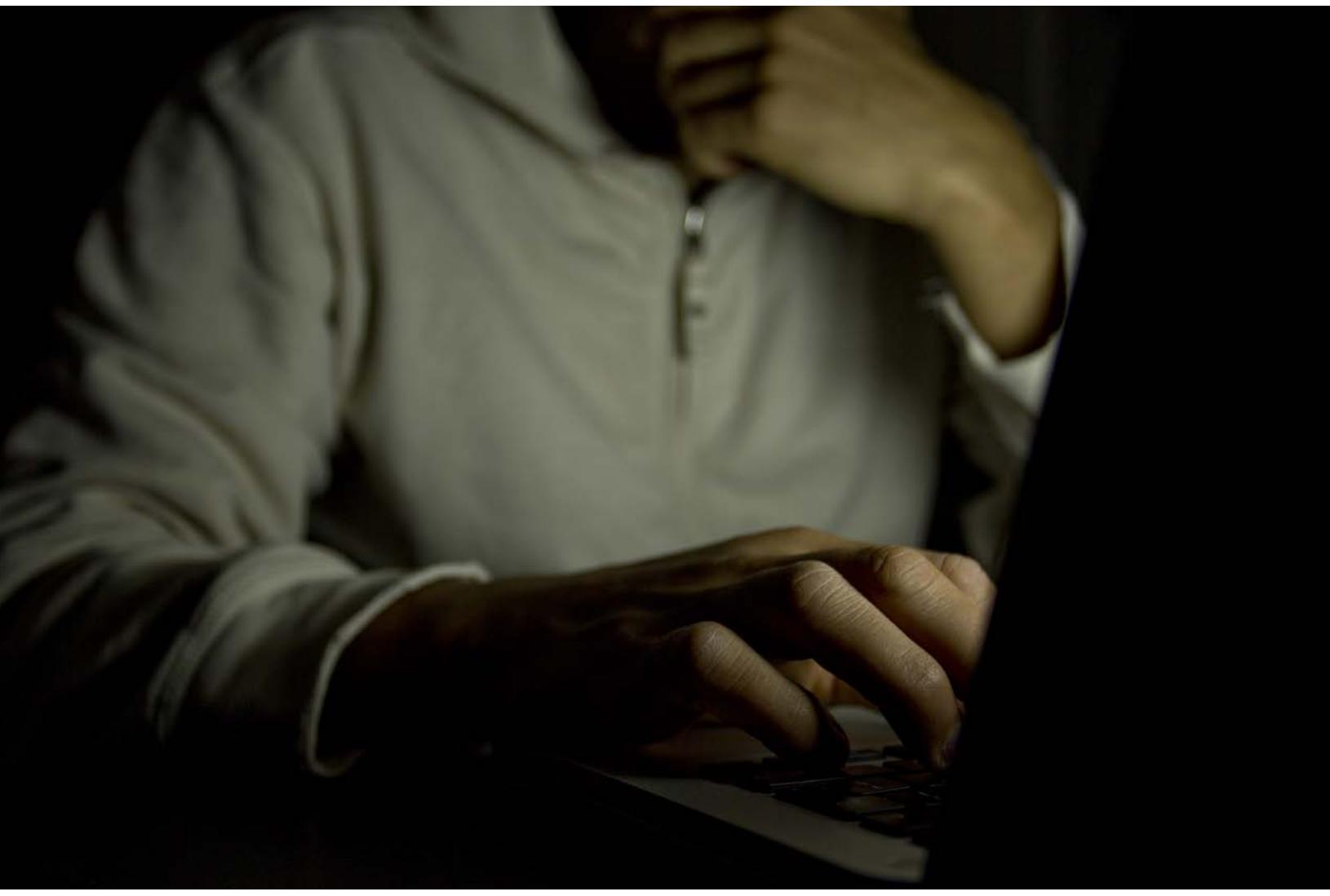
It is estimated that problem gamblers between the ages of 18–25 lose an average of \$30,000 and also accrue \$20,000 to \$25,000 in credit card debt per year. Students are using and losing money intended to be spent on tuition, fees, and books.



**Figure 15.** About 2–5 percent of the U.S. population has a gambling addiction, but among college-age students, the rate is nearer to 9 percent.

## Pornography/Sexual Addiction

The Society for the Advancement of Sexual Health (SASH) recognizes that sexual behaviors can become compulsive or addictive. Defining sexual addiction is complex and may include a range of behaviors from masturbation and pornography to the sexual exploitation of others (*Figure 16*).



**Figure 16.** Sexual addictions can include many different behaviors such as masturbation, pornography, and the sexual exploitation of others.

SASH gives three basic things to consider when asking yourself if you have a sex-related addiction:

1. Do you feel out of control regarding whether you engage in a particular form of sexual behavior?
2. Do you experience significant consequences because of a specific out-of-control sexual behavior?
3. Do you constantly think about your specific out-of-control sexual behavior, even when you don't want to?

If you answer yes to any or all of these questions, SASH suggests seeking professional help.

Some people claim that these behaviors are not addictions, preferring the term "compulsive behavior." Others would say that pornography and other sex-related behaviors are not antithetical to a normal life. However, those who have a problem with pornography and other addictions often claim that pornography is a more difficult addiction to overcome than substance addictions. As stated earlier, researchers have demonstrated that the brain activity of people exhibiting these behaviors corresponds to the brain activity of substance addictions.

# Problematic Behaviors with Technology

Due to increased prevalence in daily life, overuse or misuse of personal technology such as computers, video games, television, tablets, and cell phones continues to rise (*Figure 17*). The Center for Internet Addiction Recovery features a web-based questionnaire called the Internet Addiction Test developed by Kimberly Young. The questionnaire is posted and can be completed and scored at their website ([netaddiction.com](http://netaddiction.com)).

There are a number of centers dealing with the problematic behaviors associated with the use of technology. Harvard University McLean Hospital has a Computer Addiction Study Center. Dr. David Greenfield, author of *Virtual Addiction*, administers the Center for Internet Behavior in West Harford, Connecticut ([virtual-addiction.com](http://virtual-addiction.com)). The purpose of this center is to provide therapeutic services, resources, and information on Internet addiction and compulsion in the home and in the workplace. Numbers of universities are offering counseling to help students overcome problems associated with technology addiction. Mental health professionals are in the throes of trying to decide the nature and classification of these behaviors.



**Figure 17.** Technology addictions can include television, the Internet, social media, gaming, cell phone, and others.

## Dysfunctional Inner Speech

Debasing self-talk or inner speech—thinking you aren’t attractive or intelligent, for instance—is something almost everyone experiences at some point in life. In severe cases, some mental health professionals deem these internal putdowns to be an addictive behavior. Through a complex mindbody fusion, we become what we think.

Neuroscientists have found that the left hemisphere of the prefrontal cortex, specifically the left inferior frontal gyrus (LIFG), is the source of inner speech. According to Alain Morin, inner speech is thought to be deeply linked to self-awareness. Our inner speech—the silent thoughts we think about ourselves—are a key aspect of our higher-level reasoning (*Figure 18*).



**Figure 18.** Negative self-talk can become compulsive, although it does not cause physical alterations to the brain and can be overcome.

W. Dean Belnap, a fellow of the APA, wrote a book titled *A Brain Gone Wrong* that explores the impact of dysfunctional negative inner speech. Belnap says "Self-conversation can speak to poor acceptance. Negative talk can become a compulsion representing instructions from our simplest misgivings, to loss of control of the brain and spirit, to a primitively driven addiction, to all types of agency destroying behavior." Belnap goes on to say that "There is no way to estimate the amount of havoc and misdirection that such negative self-talk wreaks in our lives. It cripples our best intentions and seduces us to become satisfied or compelled to indulge in debased behaviors. Rid yourself of the negative self-talk and you rid yourself of your greatest foe."

Self-defeating inner speech can become compulsive and very debilitating. However, unlike the brain chemistry associated with other addictions, there is no evidence that brain damage occurs with dysfunctional inner speech. This does not minimize the power of words but rather reassures that there are effective means of ridding yourself of debasing inner speech, as discussed further in the next section on treatment and recovery from addictions.

## TREATMENTS FOR ADDICTION

Addictions present a unique problem when it comes to changing behavior because the behavior is compulsive and negative. A normal behavior change is effectively powered by our will to change. We establish a healthy base of identity and self-acceptance, analyze our motive or desire to change, make up our minds to change, and then go about doing it. This normal process is more effective the more we exert our willpower to make the change and make it a lasting change. We choose to change.

Just the opposite happens with addictions. Compulsive negative behavior tends to get worse the more we try to exert our willpower. The cravings and obsessions tend to get worse the more we think about them and exert efforts to overcome them. This is one of the dynamics of addiction that makes overcoming an addiction so frustrating and seemingly impossible. Those with an addiction believe the illusion that we control everything. We keep knocking our heads against a brick wall as we keep trying the willpower approach that normally works just fine and gets us results. Over time this incredible willpower effort we are putting forth gets us nowhere. It is confusing and exhausting! Then we assume there is no way to overcome the addiction and tend to give up.

What we have not recognized is that underlying these concerted efforts to exert our willpower to overcome an addiction is a deep-seated desire for the very thing we are trying to overcome. How do we bring ourselves to admit that we actually want this thing that is destroying our lives? This is one reason why denial is a common problem with addicts. While we are trying to exert willpower, the desire remains untouched. To overcome an addiction, we need to back off and find strength from another source to change the addictive desire. With a normal behavior change we *choose to change*; to overcome an addiction, we *choose to be changed* (*Figure 19*).



**Figure 19.** Choosing to be changed is key to overcoming an addiction.

There are proven therapeutic approaches that do work. Some take a bodymindspirit perspective dealing with every dimension of the individual. Some take a more biological/physical approach, relying on pharmaceuticals. Often a person with a serious addiction may benefit from a combination of these therapies.

## Twelve-Step Program

First introduced by the founders of Alcoholics Anonymous (AA)—Bill Wilson (Bill W.) and Dr. Bob Smith (Dr. Bob) of Akron, Ohio—the *twelve-step program* was devised as principles to help people recover from alcoholism. The original twelve steps were published in 1939 in the book, *Alcoholics Anonymous*. As people and organizations dealing with other addictive problems acknowledged the efficacy of these principles, AA gave them permission to use the twelve-step program. Millions of people worldwide have taken part in twelve-step recovery programs including Gamblers Anonymous, Overeaters Anonymous, Co-dependents Anonymous, Narcotics Anonymous, and many others. In addition, groups such as Al-Anon have been formed to lend support to family members of those with addictive behaviors (*Figure 20*).



**Figure 20.** Twelve-step programs include accepting help from others and giving help to others.

The APA dictionary of psychology gives a summary of the process people follow when doing the twelve-step program. This is not a summary of the actual twelve steps, which vary somewhat within each of the anonymous programs:

- Admitting that one cannot control one's addiction or compulsion.
- Recognizing a greater power that can give strength.
- Examining past errors with the help of a sponsor (experienced member).
- Making amends for these errors.
- Learning to live a new life with a new code of behavior.
- Helping others that suffer from the same addictions or compulsions.

## Motivational Enhancement Therapy

*Motivational enhancement therapy (MET)* is a form of counseling specifically designed to help people overcome addictive behaviors. The founder of motivational interviewing (MI) worked with researchers of the transtheoretical model, a behavior change model, to devise MET, designed initially to help people overcome alcoholism (**Figure 21**).



**Figure 21.** Motivational enhancement therapy (MET) focuses on non-judgmental listening as a means of encouraging an intrinsic motivation in the person to change their behaviors.

MET was one of three treatment methods used in Project MATCH, the largest alcoholism clinical trial ever conducted. Sponsored by NIAAA, the report of the findings was that all three test groups—12 sessions of Cognitive-Behavior Therapy, 12 sessions of Twelve-Step Facilitation Therapy, or 4 sessions of MET—resulted in substantial and statistically equivalent reductions in drinking for as long as 3 years after the treatments.

MET counselors strive to elicit from the client an intrinsic motivation to change their behaviors. This approach requires a high degree of therapeutic empathy, in the tradition of Carl Rogers. It is a non-judgmental, intensive listening style as opposed to a confrontational style. The therapist establishes a framework for change and then helps the client to acknowledge his or her ability to make that change. MET only requires four sessions and is often used in conjunction with other treatments such as the twelve-step programs. MET has been proven effective with a broad range of severity of alcohol problems. Several studies have reported positive results with marijuana and heroin users as well.

## Solution-Focused Therapy

Widely studied, this therapeutic model has moved to a prominent place in social work and health care. *Solution-focused therapy (SFT)* or solution-focused brief therapy (SFBT) began as a family therapy approach and is now being used to help individual clients with drug and alcohol abuse and other problems. SFT has some similarities in counseling technique to MET. It differs from more traditional twelve-step programs; however, it does not discourage clients from attending the meetings.

Rather than focusing on the past and specific problem behaviors, SFT focuses on helping the individual and family build a positive life in their immediate future. A signature question in this therapy is the miracle question: “If a miracle occurred in the night and your addiction disappeared, what would your next day be like?” The counselor or team of counselors work together to relate to the client’s level of motivation and not take an expert role that defines a person’s attitude or behavior. Positive support encourages the individual to embrace the resources he or she has to move forward. Possible resources include one’s family or other relationships that will help provide solutions (*Figure 22*).



**Figure 22.** If a miracle occurred in the night and your addiction disappeared, what would your next day be like?

# What If Your Loved One Has a Problem?

If you believe a friend or a loved one may have a substance abuse problem or addiction, there are steps that you can take to help. If your friend is willing, there are resources to which you can direct them. The National Institute on Drug Abuse provides articles, videos, and other resources that provide good information about addiction, why it is hard to stop, and where to get help. To start, refer your friend to the article, "What To Do If You Have a Problem with Drugs," which is available on the National Institute on Drug Abuse website ([www.drugabuse.gov/related-topics/treatment](http://www.drugabuse.gov/related-topics/treatment)).

If your friend or loved one is resistant, you can still give them information that will help them when they are ready. Find health professionals who specialize in addiction. Two organizations with patient referral programs are:

**American Society of Addiction Medicine** ([www.asam.org](http://www.asam.org))

**American Academy of Addiction Psychiatry** ([www.aaap.org](http://www.aaap.org))

You can also find a treatment center by calling **1-800-662-HELP (4357)** or going to the Substance Abuse and Mental Health Service Administration website ([findtreatment.samhsa.gov](http://findtreatment.samhsa.gov)).

If a friend is not willing to change, don't be confrontational. Friends and family want to help, but they also bring a lot of emotion to the conversation. Instead of forcing an intervention, use positive incentives to motivate your friend to see a doctor.

Be supportive and encouraging. Let your friend know that asking for help is a brave thing to do. If they are worried about others finding out, including their employer, you can let them know that laws protect the privacy of those seeking drug treatment. If their employer requires a physician's note for taking time off for medical treatment, the note does not have to describe the medical condition. Treatment can work, and recovery is possible.

**Source:** National Institute on Drug Abuse.

[What to Do If Your Adult Friend or Loved One Has a Problem with Drugs](http://www.drugabuse.gov/related-topics/treatment).

Current research has demonstrated the important social nature of addictive behaviors. Obesity can spread among friends (pardon the pun) and smoking cessation is likely to occur if associates quit smoking too. Having examined 53,228 family or social relationships derived from the longitudinal data gathered in the Framingham study, Dr. Nicholas Christakis at Harvard Medical School, and his co-author, James Fowler at the University of California, reported that people quit smoking in clusters. Their previous research also indicated that obesity spreads among friends much like an infectious disease.

## Medications for Addictions

The use of medications for treatment of various addictive behaviors has a long history of controversy and ineffectiveness. Newer drugs, however, are proving to be effective, especially when used with the therapies already discussed.

Methadone has been used effectively in treating opiate addictions, especially heroin addicts. It helps to lessen the withdrawal symptoms and is used for long-term maintenance. Approximately 200,000 Americans are on methadone maintenance to help them live a more normal life. Most doctors require patients to go to a licensed clinic daily to receive a single dose of methadone. Levo-alpha acetyl methadol (LAAM) offers the same advantages as methadone. Some doctors prefer LAAM because it doesn't need to be administered as frequently. Two forms of buprenorphine, Subutex and Suboxone, are also being used to treat opiate addictions.

Naltrexone has been FDA-approved since 1994 to treat alcoholism. It helps reduce the cravings for alcohol and increases uncomfortable feelings of nausea and headache when alcohol is consumed. These do help curb the desire for alcohol and getting the patient to use the drug is a challenge. Researchers have developed a longer-acting injectable form of naltrexone, Vivitrol, to offset the problem of non-compliance. Acamprosate, sold as Campral, is another medication used to treat alcoholism.

## Life After Addiction

There is life after addictive behaviors (*Figure 23*). Often, we find ourselves in multiple addictions or we may tend to substitute one addiction for another. Coming to a full recovery requires a solid foundation of wellness, applying the principles and practices we are exploring together in this book. Wellness living must be fun, not drudgery. This is true for each one of us whether we are dealing with addictions or not.

However, depending on the seriousness of a person's addictive behaviors, recovery may not be a return to a former life. It may be that there really was no former life worth calling a real life. It may have been filled with lies, denial, manipulation, or no real friendships or purpose. In that case, recovery may mean starting from scratch, getting a new life. This is a great opportunity to make it what you really want. Good nutrition, joy found in eating, fun-filled exercise, and physical activity might be pleasures that are new to you. Learn to be active and to relax—this is not the time to be pushing yourself into other obsessive behavior. Most of all, seek that marvelous balance and harmony of your whole self. Addictive behaviors can be horribly devastating, but they can be overcome!



**Figure 23.** There is life after addiction.

## MOVING FORWARD

Having completed this chapter, expected outcomes for you include:

1. Honest introspection to see if you have any addictive behaviors or substances in your life. Do an honest appraisal so you can begin to eliminate them.
2. Assess your environment to identify positive support to help yourself or others work to overcome addictions and addictive tendencies.
3. Be willing to accept help and not fall into the “will-power trap.” Help others to do the same.
4. Identify triggers that set off the addictive behaviors. Work to reduce these and eventually eliminate them altogether.

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# GLOSSARY TERMS

**Addiction:** That which you know is harmful to you, but that you feel compelled to continue and the need to lie about your behavior.

**Alcoholism:** A primary chronic disease with genetic, psychosocial, and environmental factors influencing its development and manifestations; often progressive and fatal.

**Binge drinking:** Five drinks in a row for a man and four drinks in a row for a woman (the 5/4 definition).

**Blood alcohol concentration (BAC):** A measure of intoxication; the amount of alcohol present in the blood.

**Dopamine:** A hormone and a neurotransmitter; functions in the brain include motivation and reward, mood, learning, and motor activity.

**Ethyl alcohol:** A colorless, pungent liquid; the intoxicating ingredient in alcoholic drinks.

**Fetal alcohol syndrome (FAS):** Physical and mental alterations in a child caused by heavy drinking by the mother during pregnancy.

**Nicotine:** The active drug in tobacco products.

**Nucleus accumbens (NAcc):** A collection of neurons located in the basal forebrain where dopamine-secreting neurons from the VTA terminate.

**Ventral tegmental area (VTA):** A portion of the midbrain whose neurons are part of two dopamine pathways (the mesolimbic and mesocortical pathways).

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Live a Healthy Lifestyle within  
Family, Community, and the World

## How Can I Contribute?

We live in the best of times and the worst of times. Our world suffers from economic disparity, violence, and environmental uncertainty. Yet we enjoy a remarkable era of human achievement and are surrounded by beauty that nature provides. If we live our lives with a good measure of respect for ourselves and an understanding of how to establish a healthy lifestyle, we should expect to enjoy a sound quality of life filled with purpose, happiness, and the capacity to contribute to the well-being of others.

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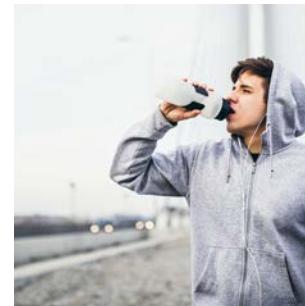
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Your finances, job, and the environment in which you live all contribute and affect your health, overall wellness, and happiness. Your goals and success, money, job, environment, friends and family, are all integral to your healthy lifestyle.



## After reading this chapter, you will be able to:

- › **IDENTIFY** four elements of financial well-being and explain how money impacts life satisfaction.
- › **DEFINE** occupational well-being and describe how it contributes to your healthy lifestyle.
- › **EXPLAIN** how your environment affects your wellness and your impact on the environment around you.
- › **IDENTIFY** common risks to injury and explain how you can avoid those risks.
- › **DESCRIBE** how you should prepare for the challenges of giving birth, raising children, and aging.
- › **LIST** the traits and behaviors that lead to happiness and develop strategies and tactics that will enable you to achieve happiness throughout your life.



**Figure 1.** A healthy lifestyle will help to keep you physically and mentally “young” even as you get older chronologically.

## How Can I Contribute?

live a healthy lifestyle within  
family, community, and the world

## HAPPINESS IS AN OUTCOME OF GOOD HABITS

It is one thing to be healthy and active now because it is often a natural part of being young, but how can you stay young throughout your life? Well, of course you will not stay young in age, but you can think young and continue to be active and productive. People who maintain a healthy lifestyle throughout their lives look, act, and feel much younger than their chronological age (*Figure 1*). Your fitness age may continue to be around 30 even though your actual age is 59. What this means is that you have a similar capacity and energy level that you did 30 years earlier.

### Positive Attitude for a Healthy Lifestyle

A healthy lifestyle cannot be effective if you see it as drudgery. If that is your attitude now, you certainly need an attitude adjustment!

As we have said before, just out and out discipline—forcing yourself to do something—is not a readily sustainable motive. The bottom line to living a healthy lifestyle is what you think and believe (*Figure 2*). Analyze your attitudes to see what it will take for you to perceive healthy living as the most positive, the most fun, the most exciting and pleasurable way you can live. Living a healthy lifestyle also means you will have a great capacity to help others.



**Figure 2.** Your attitude—what you think and believe—is key to living a healthy lifestyle.

## Plan Healthy Living for Your Entire Life

Once you have established a positive attitude toward making healthy choices, you can, in reality, plan for healthy living for your entire life. This means you will reap the benefits described above plus many, many more. You will be less prone to depression, not experience the negative effects of chronic stress, have the energy to meet the demands of each day, can expect to have positive relationships for the most part, and will tend to be optimistic rather than living by fear. This means that you will be resilient rather than rigid in your approach to life. You will be able to adapt to changing situations and see the opportunities embedded in change.

These attributes accompany a healthy lifestyle because your whole being is enhanced by the choices you will be making on a regular basis. Healthy living becomes a way of life that is so rewarding, you do not want to abandon it. Even though others around you might not value taking time to relax or taking time to work out, you will set the course of your own life.

## Reduce Your Vulnerability

You also will be less vulnerable in many areas. Because of your self-reliance and confidence, it will not be easy for others to sell you on a quick fix, whether it is financial, regarding health, or any other life concern. The reason you are not vulnerable to a quick fix is because you do not need it. For instance, it is so much easier to maintain a healthy weight than to lose weight you have gained. If you maintain a healthy weight, you do not need the ultimate weight-loss program someone is peddling. The same holds true if you have savings set aside.

Your contentment with your healthy life will give you a very reasonable level of peace and security (*Figure 3*). This is not complacency by any means, but is one of the finest benefits of healthy living. It is fear, negativity, and needing to escape that keeps us in couch potato mode. With this peace in your life, there is nothing from which you need to escape. You want to look for ways to contribute, to excel. Peace motivates you in a positive way and does not rob you of motivation.



**Figure 3.** You will experience a sense of contentment and peace when you are living a healthy lifestyle, and this will radiate to the lives of other people in your life.

## MONEY AND LIFE SATISFACTION

As most people have experienced, money can cause severe stress or degrees of happiness. Satisfaction with life can be affected by how much money you have, but is not strictly aligned with income level. Some people feel they have a high level of financial well-being even though they may be far from rich (**Figure 4**). On the other hand, some people who have a lot of money do not feel they have a high level of financial well-being at all.



**Figure 4.** Some people seem to have, and feel they have, a high level of financial well-being, even though they may be far from affluent.

## Can Money Buy Happiness?

Earning and spending money can be a major source of worry for many people. Struggling to pay the bills or save enough to send your children to college can be very stressful. Worse, evidence shows that poverty is linked to an increased risk to health. It is easy to imagine that more money can make your life more satisfying. Is it true?

The Pew Research Center's 43-nation survey on life satisfaction showed that people in richer countries were generally happier than people in poorer countries. However, the study also found that life satisfaction did not keep growing with higher incomes. In the United States, the number of people who said they were generally satisfied with life (65 percent) was not much greater than people in Vietnam (64 percent) who made far less per capita.

The Gallup-Healthways Well-Being Index, a daily survey of 1,000 U.S. residents, found that emotional well-being rises with income, but only until income levels reach approximately \$75,000 per year; after that there is no additional increase.

Money can buy a certain amount of life satisfaction because it can make it easier to cope with life's everyday needs and pressures, but having \$1 million dollars won't guarantee your happiness.

## The Four Elements of Financial Well-Being

Researchers at the Consumer Protection Bureau (CPB) interviewed many people across the United States. The CPB researchers also talked to financial experts. They learned that people have many different ideas for what makes life financially satisfying. However, they learned that there are two things that most people want: security and freedom of choice, now and in the future.

When people were asked what they meant by security and freedom of choice, they boiled it down to four key elements:

- Control over day-to-day, month-to-month finances;
- The capacity to absorb a financial shock;
- Being on track to meet your financial goals; and
- The financial freedom to make the choices that allow you to enjoy life.

These elements of financial well-being have strong time-frame dimensions (*Figure 5*). Control over day-to-day, month-to-month finances and being on track to meet financial goals are about the present. The ability to absorb financial shock and freedom of choice are about the future.



*Figure 5. The four elements of financial well-being.*

### Control Over Day-to-Day, Month-to-Month Finances

Having financial control is what the CPB researchers discovered was key to financial satisfaction for most people. People who have relatively high financial satisfaction feel in control of their day-to-day financial lives. They manage their finances; their finances do not manage them. They are able to cover expenses and pay bills on time. They do not worry about having enough money to get by.

## The Capacity to Absorb a Financial Shock

Another important factor for people was having the ability to absorb a financial shock, such as the loss of a job or unexpected major expenses. They can cope with the financial challenges of unforeseen life events or absorb financial shocks with these resources:

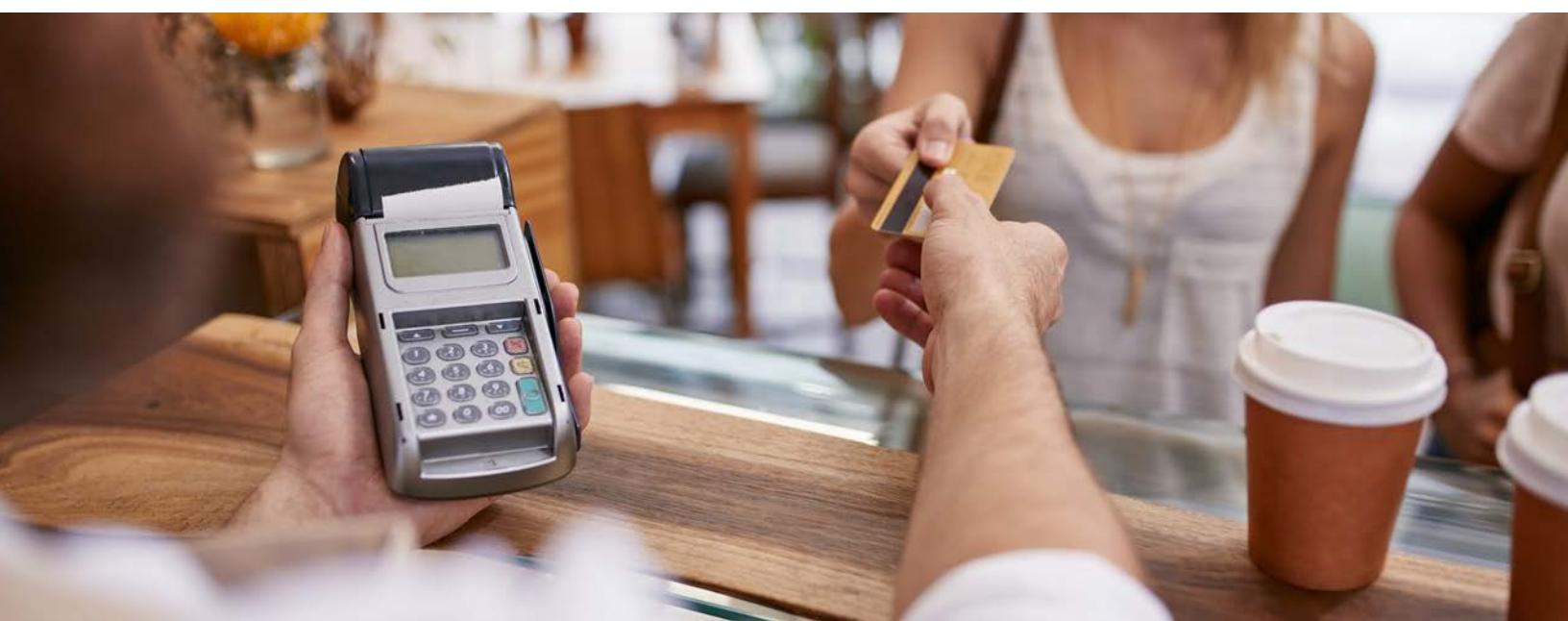
- a support system of family and friends
- money in a savings account
- health, property, and other types of insurance

## Being on Track to Meet Your Financial Goals

People who experience financial satisfaction also say they are on track to meet their financial goals. They have a formal or informal financial plan. They actively work toward goals, such as saving to buy a car or home, pay off student loans, or save for retirement.

## The Financial Freedom to Make Choices

Finally, people who experience financial satisfaction say they can make choices that allow them to enjoy life. They can splurge occasionally. They can afford “wants,” such as going out to dinner, taking a vacation, or meeting a friend for a cup of coffee (*Figure 6*).



**Figure 6.** It is nice to have the freedom to make financial choices.

Freedom of choice is expressed strongly and in a variety of ways by many people. It means:

- Being able to be generous with family, friends, and community
- The ability to go back to school or leave one job to look for a better one
- Go out to dinner or go on a vacation
- Work less to spend time with family

Because values can vary greatly for everyone, income or net worth alone are not an accurate measure of financial well-being. Deeply personal preferences and aspirations give meaning and purpose to the often challenging day-to-day financial decisions and tradeoffs we all must make to achieve it.

# IMPORTANCE OF OCCUPATIONAL WELL-BEING

Occupational well-being is personal satisfaction and enrichment in your life through work, and perhaps most importantly, your attitude about your work. It is about getting the most out of your career and your job, both personally and professionally. Professionally you want to be successful, enjoy your work, and earn enough money to achieve your lifestyle goals. Occupational well-being also includes having opportunities to contribute your knowledge and skills to a larger community.

When you go to work, you should enjoy being there. You should enjoy what you do, the people with whom you work, the environment, and your future prospects. You should be satisfied with your compensation (*Figure 7*).



*Figure 7.* People primarily go to work to earn a living, but it should also be something you enjoy.

The main reason most people go to work is to earn a living. But like the rest of life, you shouldn't settle for a job that you don't enjoy or may even be detrimental to your health. Being aware of how your job impacts your wellness includes developing the knowledge and skills to be successful on the job, forming relationships with coworkers, earning money and other benefits, and feeling good about the job you do.

## Balancing Your Family and Relationships

Your job should not dictate how you lead your life. Even though you may love your job and don't mind putting in long hours doing it, it can be challenging to balance time at work and time spent with family, friends, and leisure time for yourself.

Demands of work can adversely affect family obligations. Missed opportunities to see your child's school play or baseball games cannot be recaptured. Work stress can invade your home space and cause conflict within your family. Even if you have few family responsibilities, work overload can affect your ability to nurture friendships and have time for leisure activities.

# Managing Personal Finances

Your financial well-being is closely tied to your job. How much money you make determines how much you can spend and how much money you must make. It is vitally important to live within your means—not spend more than you make. In fact, greater peace and happiness will result if you can live on 80 percent of what you make and save the rest.

Avoid debt like the plague. Some debt is expected and warranted such as mortgage payments or car payments. As we discussed in earlier chapters, try to avoid credit card debt and the bondage that accompanies it.

## Caregiving

Programs that help workers to care for children and other family members include:

- on-site childcare
- emergency childcare assistance
- seasonal childcare programs (such as spring break or Christmas)
- eldercare initiatives (may range from referral program, eldercare assessment, case management, a list of local organizations or businesses that can help with information or products, or seminars and support groups)
- family-leave policies for the birth of children, adoption, care of elderly or sick parents or other family members

## Education and Job Skills Development

Employers often provide additional resources and incentives:

- time-off and/or financial subsidies for education and job skills development;
- time-off or matching programs for community service;
- on-site education, counseling, and resources for managing personal finances

## Health and Fitness Promotion

Health-related programs and resources include:

- Healthcare benefits that promote preventive care, such as annual physical examinations and dental examinations and teeth cleaning.
- Employee assistance programs that help employees with problems at work or at home, including mental and emotional issues, addiction, stress, grief, and financial distress.
- Educational resources and activities that raise awareness and help people change behaviors, including smoking cessation, stress reduction, increase physical activity, or improve diet.
- Healthy food choices on-site, from healthy vending machines to cafes.
- On-site fitness facilities, on-site fitness classes (yoga, aerobic dance, or spinning), financial assistance for fitness club memberships, or other incentives to promote healthy living.

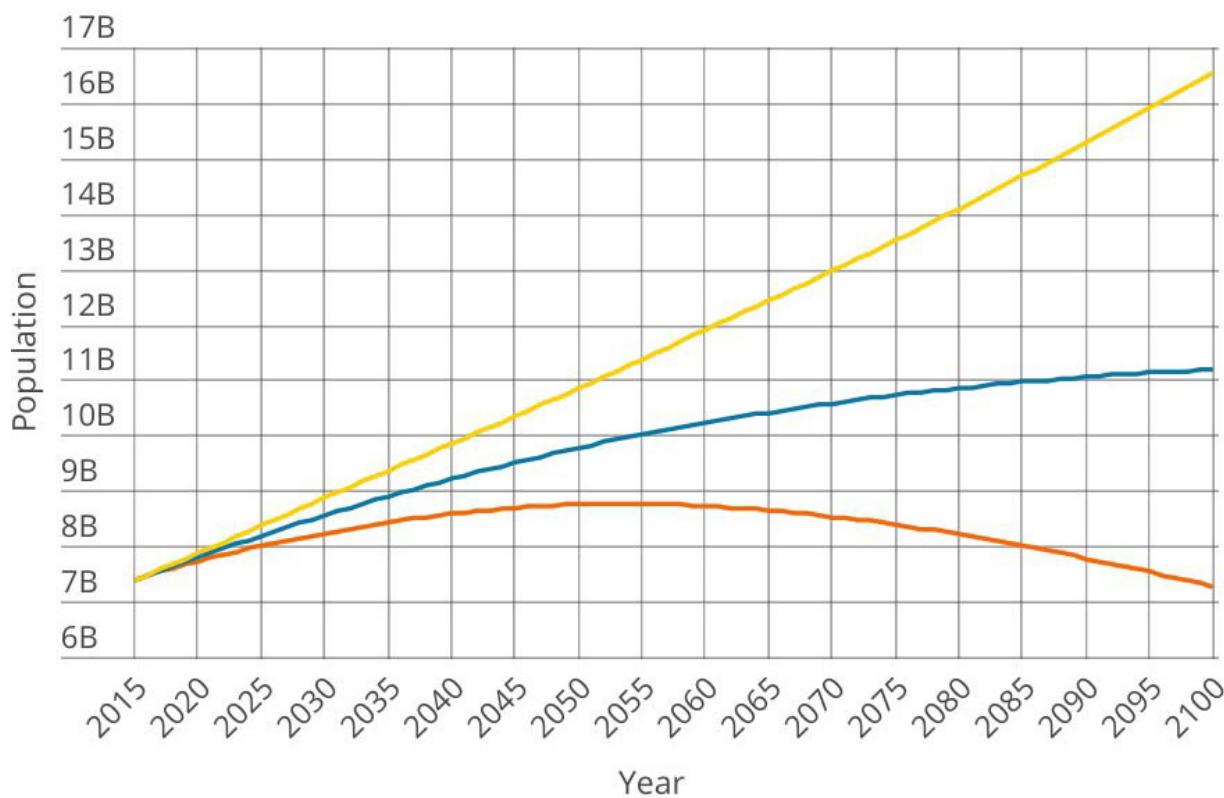
# THE ENVIRONMENT AND YOUR WELL-BEING

Environmental well-being is a two-way interaction between you and the world around you. It means living in harmony with the natural surroundings and making choices that are considerate of the resources you share with every other person on this planet. Conserving our natural resources is an essential component of environmental health; responsibility for your environment involves more than just picking up trash or choosing to recycle plastics and paper. It also means being aware of your surroundings and engaging with your community. Your community can impact your health and well-being. And you can impact the health and well-being of your community.

## The Human Impact on the World's Environment

According to the United National Population Fund, there are approximately 7.9 billion people living on our planet. Remarkably, the population has increased by 6.9 billion people in the last 200 years. Improved health care and living standards during that time have enabled more people to survive to an age when they can reproduce, and these same advances enable more people to live longer lives. Since the 1990s, the average global lifespan rose from 64.8 years to 70+ years today.

*Figure 8* shows projected world population growth according to fertility rate, which is the average number of children a woman has by the end of her reproductive life. The population of the world is projected to slow and level off to approximately 11 billion people by the end of the 21st century. Because fertility rates are a significant driver of population growth, population growth could be lower if fertility rates decline.



- Low variant
- Medium variant
- High variant

*Figure 8.* This graph shows projected world population growth, depending on fertility rates.

The rate of population growth is not the same everywhere. In countries that are less developed economically, populations are expected to double or more by 2050. In countries with higher incomes, population increases are slower and in some cases, not increasing. The U.S. Census Bureau estimates that the U.S. population is 329.5 million people, and expected to grow to 458 million people by 2050. The impact of population is seen in global warming, sustainable economic growth, migration, and a shift from rural to urban communities. Some problems are local. Less developed countries are challenged to create sustainable economies in which all people have food and shelter. More developed countries are seeing their populations grow older, which could cause increases to health care costs and labor shortages. And a country's population is not necessarily proportional to its contribution to the global environment. For example, the United States' population is approximately 5 percent of the world's total population, yet it produces 25 percent of the world's carbon dioxide emissions, which contribute to global warming.

## Global Warming Is a Real Threat

There is a significant amount of scientific evidence that our planet is warming at a significant rate compared to the past 1,300 years. The scientific evidence also demonstrates that this global warming trend is largely caused by the human production of greenhouse gasses, such as carbon dioxide. Carbon dioxide is a byproduct of fossil fuels, such as oil and coal. While global warming refers specifically to the increase in average temperatures due to human causes, it does not mean that everywhere is getting warmer.

## Clear Evidence: Humans Are the Cause

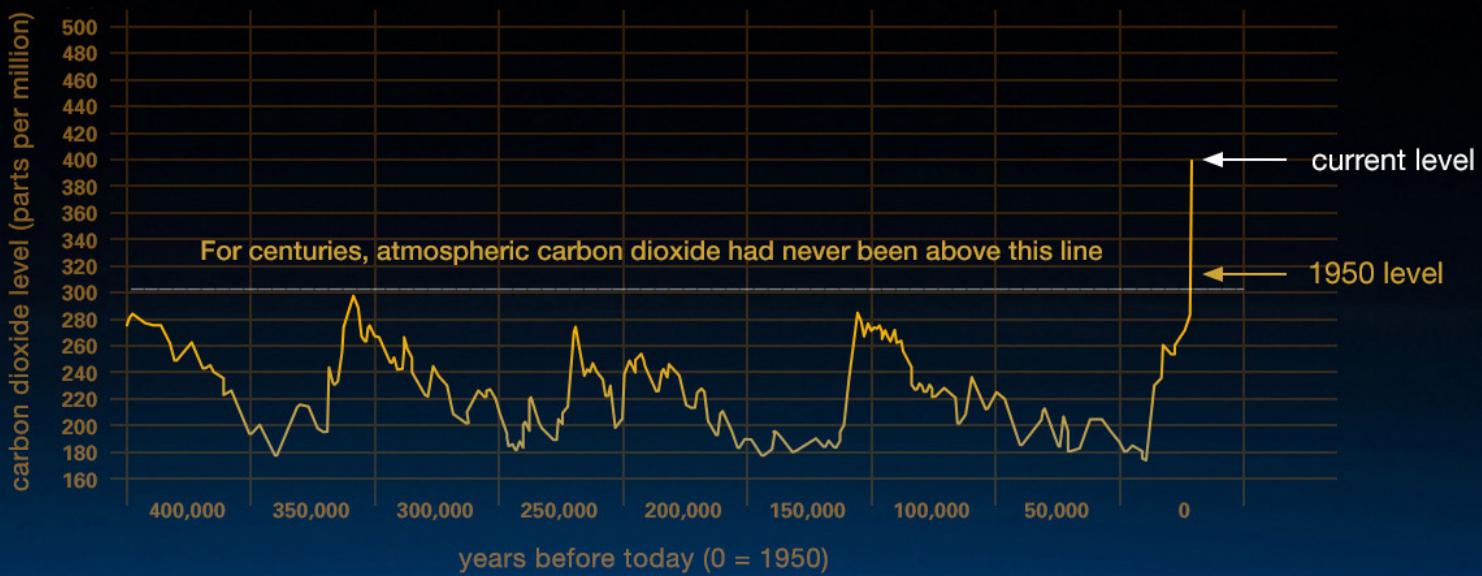
Almost all climate scientists agree that humans are causing global warming. Since the beginning of the Industrial Revolution, we have increasingly relied on fossil fuels to improve our economies and our lifestyles. We use fossil fuels to run factories, power planes, trains, and automobiles, and generate electricity that heats our homes, lights our streets, and re-charges our mobile phones. As the world population grows, so does the amount of garbage that must be dumped into landfills or burned.

The byproduct of all this activity is the release of large amounts of carbon dioxide ( $\text{CO}_2$ ), nitrous oxide ( $\text{N}_2\text{O}$ ), methane ( $\text{CH}_4$ ), water vapor ( $\text{H}_2\text{O}$ ), and other gasses into the atmosphere. This layer of gas molecules traps heat in the lower atmosphere, causing a greenhouse effect that increases the temperature of the earth.

## Evidence That the Planet is Getting Warmer

How do we know that the planet is getting warmer? Scientists use ice core samples to learn about the earth's atmospheric conditions over thousands of years. Ice cores are taken by drilling deep into ancient glaciers and ice sheets, which have trapped and preserved chemicals from the air for many thousands of years. Each layer in an ice core enables scientists to study the conditions of the earth's atmosphere during a specific period. The researchers measure local temperature, snowfall, solar activity, volcanic activity, and the amount of greenhouse gasses. They can then compare the data with recent observations of the earth's atmosphere. *Figure 9* is a chart that shows the dramatic increase in carbon dioxide levels since 1950, a spike to a level far greater than any measured in the last 400,000 years.

The effects of global warming on our climate are significant and measurable. Melting ice caps are causing sea levels to rise at a rate double of the last century. The number of extreme weather events, such as violent storms, large rainfalls, floods, and drought appear to be increasing. The acidification of the oceans increased 30 percent since the mid-18th century, the start of the Industrial Revolution. Ice sheets, glaciers, and sea ice are shrinking rapidly.



**Figure 9.** This graph shows scientific evidence that atmospheric CO<sub>2</sub> significantly increased since the Industrial Revolution.  
**Source:** Vostok ice core data/J.R. Petit et al.; NOAA Mauna Loa CO<sub>2</sub> record.

## Cleaner and Safer Environments

In the past century, much was done to make our environment cleaner and safer. This is one reason why life expectancy is twice what it was 100 years ago. Improved sanitation, cleaner air and water, and better safety at work, home, and in our communities contribute to reducing disease and accidents.

In the last 50 years in the United States, these accomplishments have lowered risk for chronic disease:

- Gasoline free of lead and benzene, which increase the risk of cancer
- Reduction in smog for more breathable air
- Restriction of harmful chemicals, food dyes, and pesticides that caused cancers and other diseases
- Reduction of unhealthy ingredients in packaged and fast foods, such as trans-fat and added sugar

There are things each of us can do to contribute to cleaner air. Conserve energy at home, carpool or use public transportation when possible, and do what you can to reduce driving time. Keep engines tuned up and use environmentally safe paints and cleaning products.

The Energy Information Administration (EIA) of the U.S. Department of Energy reports net electrical generation from renewable sources such as wind, hydro, biomass, geothermal, solar thermal, and photovoltaics is about 18 percent.

Sometimes we think because these are global issues there is not much we can do as individuals. But there are many ways we can create and restore a healthier environment, starting with each one of us.

## Air Pollution

Ozone forms a layer in the upper atmosphere that shields the Earth from the ultraviolet rays of the sun. However, at ground level, ozone can be detrimental to health, particularly proper functioning of the lungs. Ground-level ozone comes from all kinds of motor vehicles and other things that burn fuel, and from some paints and cleaning products.

The U.S. Environmental Protection Agency (EPA) has developed the Air Quality Index (AQI) to inform the public of air pollution levels in specific locations nationwide (*Figure 10*).

AQI Basics for Ozone and Particle Pollution

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

**Figure 10.** The EPA's Air Quality Index (AQI) is used to inform the public of air pollution levels in specific locations nationwide. You can find the AQI for your area online, in your local newspaper, or on a local radio broadcast.

**Source:** U.S. Environmental Protection Agency.

The AQI considers five pollutants: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. You can find the daily report of the AQI for your area in your local newspaper, online, or on your local radio broadcasts.

It is important to be aware of the quality of the air, especially when you are outside and physically active. Here are important points to remember:

- Cut back on the duration and intensity of your exercise when the AQI is more than 150.
- Avoid places with cigarette smoke, a lot of dust, or other materials floating in the air. Pay attention to how your body feels, especially if you have trouble breathing or experience tightness in your chest, a sore throat, coughing, a headache, or eye irritation.
- Avoid exercising around a lot of motor vehicle traffic.
- If possible, exercise indoors on hot days when the ground-level ozone is the worst.

## Availability of Clean Water

In the United States, almost everyone enjoys access to clean, safe water for drinking, bathing, cooking, and other uses. Throughout the country, municipalities are responsible for providing safe water to residents by managing water sources, sanitizing the water, and maintaining the infrastructure that carries the water to homes and businesses.

In 1974, the U.S. Congress passed the Safe Drinking Water Act (SDWA), which protects drinking water throughout the United States. The Environmental Protection Agency (EPA) sets the standards for safe drinking water and is responsible for enforcing the law.

### Clean Water and Health

Polluted and untreated water can transmit infectious diseases, such as diarrhea, cholera, dysentery, hepatitis A, typhoid, and polio. Water can also carry dangerous chemicals, such as arsenic or lead.

Corroded metal service pipes, which bring water from the main water line into your home, can leach lead into the water. Lead can cause learning, behavioral, and hearing problems in children. Lead in the blood-stream of pregnant women can reduce the growth of the fetus and cause premature birth. Exposure to lead increases the risk of hypertension, can inhibit kidney functions, and cause reproductive problems for men and women.

## Challenges to the Water System

Yet there are challenges to our water systems. Municipal water facilities are getting older, and are difficult and expensive to replace. There are many old buildings with aging water pipes that could leach lead into drinking water. There are other dangers that could threaten our water sources.

In April 2014, city and state officials switched the source of drinking water in Flint, Michigan (*Figure 11*). The water was drawn from the polluted Flint River. Almost immediately, residents complained about the smell and color. In May 2014, *E. coli*, a dangerous bacterium, was detected in the water and residents were told to boil the water before drinking it. Because of corrosive elements in the river water, Flint's water pipes corroded, releasing dangerous levels of lead into the water, more than twice the level at which it is considered hazardous.

Flint, Michigan's drinking water crisis is a cautionary tale about something that most people living in the United States take for granted: clean drinking water. According to the World Bank, 99 percent of people living in North America have access to clean drinking water. The percentage of the world population with access to safe drinking water has improved over time, but progress has been slow. In 2015 only about 70 percent of the global population had access to safe drinking water. In 2020 the percentage is about 74 percent. At this rate of increase the percentage of people with safe drinking water access would be about 82 percent by 2030. It is an important world public health issue since unsafe water sources are responsible for approximately 1.2 million deaths annually.



*Figure 11. Government policies can affect your health. Source: Barbara Kalbfleisch / Shutterstock.com*

## Geography, Weather, and Your Physical Fitness

Another obvious impact of the environment on your health is the geographical location of where you live. Climate and seasonal changes play a significant role in your ability to maintain consistent exercise patterns. Excessive heat or cold spells are major impediments to outdoor activities. Having an alternative mode of exercise under these conditions is imperative if you are going to reach and maintain your fitness goals.

Because it is relatively easy to keep a steady body temperature from day to day, we may not realize how sensitive our bodies are to changes in temperature and the problems that can cause. Overheating (hyperthermia) and dehydration can result in heat cramps, heat exhaustion, or heatstroke. If the body temperature goes down because of extreme cold, a person may be subject to hypothermia or frostbite.

## Precautions for Physical Activity in Warm Weather

*Heat cramps* are like regular muscle cramps but are specifically caused by getting overheated. Without sufficient water, sodium, and other electrolytes in your system, your muscles will become fatigued. To avoid muscle cramping, drink water to keep hydrated, and if you are physically active for longer than 60 minutes, consume a sports drink to help restore electrolytes (*Figure 12*).



*Figure 12.* Keep hydrated when you exercise.

If you experience muscle cramps, get out of the heat and find a cool place where you can carefully stretch your muscles and rest until you are fully recovered.

*Heat exhaustion* is a serious condition that must be treated immediately. Heat exhaustion may come on gradually. A person with heat exhaustion may feel unusually weak and faint. Their face will become white and their pulse weak and fast. If you see someone experience heat exhaustion, or if you begin to feel it yourself, go into a cool place and drink fluids. Rest as much as possible for the next 24 hours. Apply cool wet towels to help lower the body temperature.

*Heatstroke* is the most serious of the heat-related illness conditions—the person needs to be hospitalized as quickly as possible. Attempts should be made to cool the person by getting them out of the heat, wrapping the body in cold towels, and having them drink cold fluids. The symptoms you will see include a flushing or redness in the face, chills or shivering, and the person may become very confused or even pass out.

## Exercising in Cold Weather

Hypothermia is serious and requires immediate medical attention. This term describes the lowering of the body's core temperature due to exposure to cold air or water. The body loses more heat than it can produce, which can lead to lower metabolism, feeling sleepy and faint, and, if not treated, eventual coma or death. Hypothermia is possible if a person is exposed to water below 60 degrees Fahrenheit, or air temperature below 50 degrees Fahrenheit. Treat the person by covering them with warm blankets and getting them out of the cold. The person may feel a false sensation of being warm. Nevertheless, keep the person wrapped in blankets and do not let them remove their coat. Get medical help as soon as possible.

Frostbite also requires medical attention. Body tissues freeze because of exposure to extreme cold. It usually occurs in fingers and toes, and tissues in the face and ears. The tissues at first feel a tingly sensation. It will then become numb and swell. The skin will begin to change color, turning pale then purplish and then black. Frostbite is very painful.

If you experience frostbite, warm the affected area by wrapping it loosely in warm clothing, a blanket, or other insulating material. Try to keep your fingers and toes still to avoid further damage to the skin. For this reason, never rub, massage, or apply physical pressure to the frostbitten area.

If done very carefully, the body part can be immersed in water warmed to just above body temperature to try to thaw the tissue without burning the skin. Do not use dry heat, such as a hairdryer, campfire, or radiator. Most importantly, seek medical help as soon as possible.

## Your Neighborhood and Physical Fitness

Neighborhoods are powerful influences on well-being. Research shows that people living in a neighborhood with lower levels of education and higher poverty are less likely to exercise and be physically fit.

While a higher level of income may be a predictor of success with exercise, the neighborhood you live in may be more important than wealth. The reason may simply be that people have the resources or desire to exercise, but a neighborhood that does not provide for the safety or means to allow or inspire exercise, at least outdoors, is a barrier for many people.

Several neighborhood characteristics are predictors of success with exercise. Higher levels of exercise occur in areas where trust and community support among neighbors is thought to be higher and where violence is perceived to be low. The walkability provided by safe sidewalks, streetlights, and proximity to fitness facilities, paths, parks, and shopping centers are also key (*Figure 13*).



**Figure 13.** It's easier to exercise in an environment that encourages you to get outside and move while feeling safe.

# Government and the Environment

It is important that you are aware of how your government manages your community's resources. Local and state governments typically have responsibility for clean drinking water, sanitation, and emergency services. Federal and state governments create laws and regulations that restrict the release of toxic chemicals into the environment, workplace safety, and accessibility of public places for people with disabilities.

Government policies and the actions of public officials can directly affect the health of you and your family. For example, a cost-cutting decision made by local and state government officials resulted in the contamination of the drinking water in Flint, Michigan's, drinking water. As a result, the people living there were put at considerable risk for lead poisoning.

## Home and Work Environments

Your environment includes where you work and live. A leading cause of death in the United States is injuries, including car accidents, prescription drug overdoses, alcohol abuse, falls, and other accidents. You can reduce your risk by being aware of your environment. If you see a danger at home or at work, remove it or tell someone who can fix it. And don't do things that could endanger others. For example, distracted drivers were involved in 3,142 deaths and more than 424,000 injuries in 2020. These are people who, while driving a car or truck, were texting, talking on a cell phone, looking at maps or navigation systems, eating and drinking, watching a video, or grooming.

## Natural Environment

Outside of your community or neighborhood, you can explore the greater beauties of the world. Many people experience the benefits of environmental wellness in the peace and calm that resonates when they find themselves in nature or looking at natural phenomena. Choosing to "get away" or head to the beach, lake, or mountains to relax, reconnect, or clear your mind can be invigorating (*Figure 14*). We are optimistic that your immediate environment is supportive, and your engagement with the larger world is inspiring. Having good environmental wellness is one common way to enjoy a healthy lifestyle.



**Figure 14.** Enjoy a walk in the park. It is good for the body and soul.

# AVOID INJURY AND VIOLENCE

For young adults, accidental injury is a leading cause of death, particularly accidents related to motor vehicles. Living a long and happy life depends on making good decisions and being prudent about how you live your life. Avoiding dangerous situations doesn't mean you still can't have fun. What it does enable you to do is have more fun for longer. This section discusses common situations in which accidents happen and how to avoid them.

The National Safety Council estimates that about 4 people die every 10 minutes and 1,054 people suffer an injury severe enough to require medical attention from accidents that occur in and around the home in that same 10-minute period. The leading causes of accidents are motor vehicle crashes; poisonings, including the unintended overdose of medication, falls, choking, and fires.

## Motor Vehicle Safety

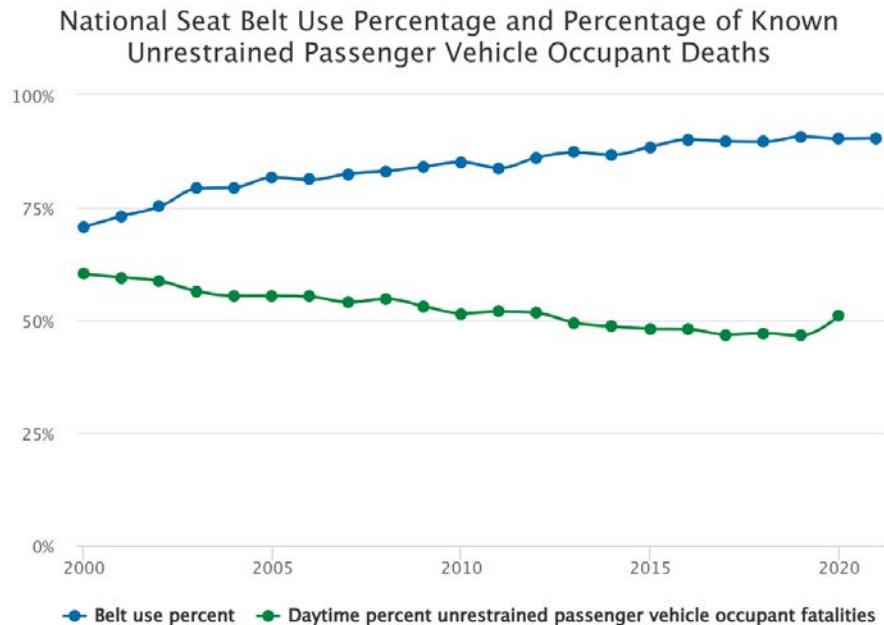
According to the National Highway Traffic Safety Association, 38,824 people died in passenger car and light-truck accidents in 2020. Nearly 2.3 million people were injured that year.

According to the National Center for Health Statistics, auto accidents are the leading cause of death for people ages 15–20.

### Seatbelts Save Lives

In nearly half the deaths caused by car accidents, the drivers or passengers were not wearing a seatbelt (*Figure 15*). Eighty percent of the fatalities were caused when the passenger was completely ejected from the vehicle. Ejection from a car or a truck causes the most grievous injuries in an accident; you have a much better chance of surviving a vehicle accident if your body is restrained by a seatbelt.

While most cars and light trucks built today have front and side airbags, you should still wear a seatbelt. Airbags are designed to cushion your body from being smashed against the steering wheel or dashboard of the car. Airbags may not keep you from flying out of the car and into the middle of the freeway.



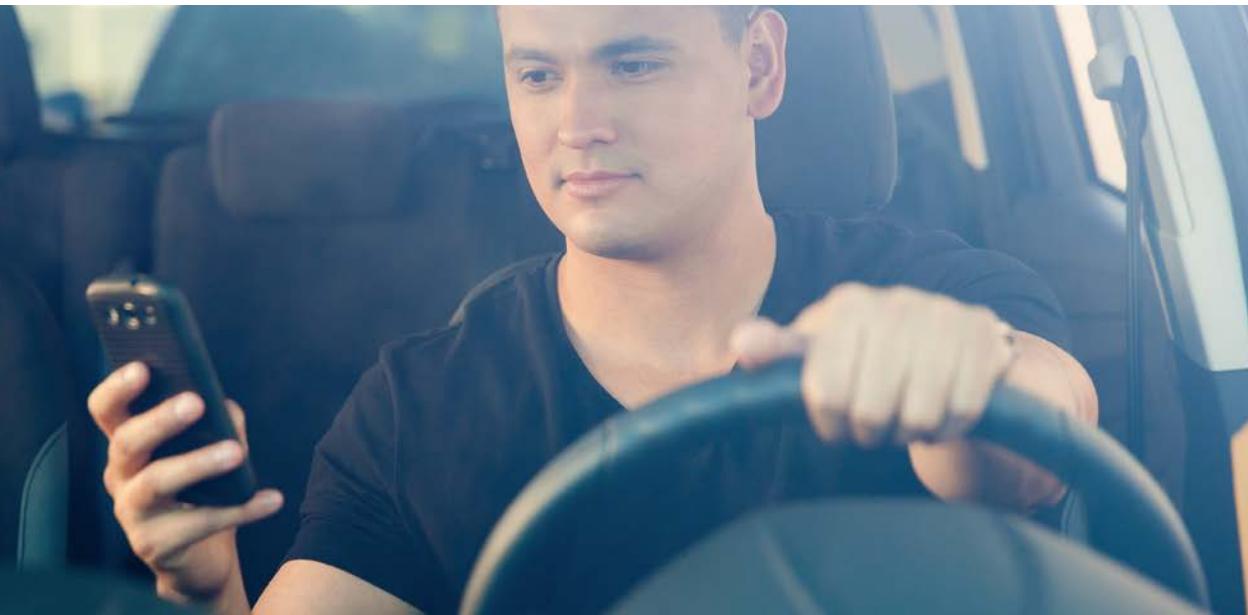
**Figure 15.** Statistics show that wearing a seat belt will increase your chance of surviving a car crash. **Source:** National Safety Council.

## Mobile Device Use and Other Forms of Distracted Driving

*Distracted driving* is any activity that can take your attention from driving a car or truck, especially distracting you from seeing the people and environment around you.

Nearly 25 percent of all auto accidents involve the driver using a mobile device to make a phone call, send or read a text, and even take a video or photos. Talking or texting on a cell phone makes you 4 times more likely to have an accident.

For this reason, it is illegal to text or use cell phones while driving (*Figure 16*). Wisdom alone should direct us to only use Bluetooth capability installed in the car and not any device that requires you to use your hands or divert your attention away from the road.



**Figure 16.** Distracted driving is a serious risk to you and others.

However, mobile devices aren't the only cause of distracted driving. Research has found that these things can turn into dangerous distractions while driving:

- Texting
- Eating and drinking
- Browsing for music on the radio or phone
- Talking to passengers
- Grooming
- Looking at a map
- Watching a video

## Influence of Alcohol or Drugs

Alcohol and drugs were a factor in nearly 10,000 traffic deaths in 2019, approximately 28 percent of all deaths caused by motor vehicle accidents. Sixteen percent of these deaths were related to drivers who were impaired by drugs other than alcohol.

Being under the influence of alcohol or drugs can be dangerous no matter where you are or what you are doing. Your risk of injury from accidents or assault increases when you are impaired physically and mentally. Use of alcohol and drugs also increases the risk to family, friends, and the community.

# Home Safety

For many people, home is a safe place physically, mentally, and emotionally. However, it is important to be proactive to keep your home safe. Unfortunately, more than 11,000 people die in the United States each year from preventable injuries, such as falls, fire, poisoning, and drowning.

## Poisoning

Poisoning is most common among children ingesting cleaning supplies or medicines. Medicines need to be put away and not left in a purse or place where children can get to them.

Keep the National Capital Poison Center number on your cell phone: 1-800-222-1222.

Signs and symptoms of poisoning include burns or redness around the mouth and lips, breath that smells like chemicals, vomiting, difficulty breathing, confusion, or other unexpected signs. If there is a burn on the skin or eyes, remove clothing and flush with lukewarm water. For ingested poisons, follow directions on cleaning agents or directions given over the phone from the poison control center.

## Falls

Falls account for nearly 9 million emergency hospital visits every year. Falls occur most often on uneven surfaces, wet areas, ladders, stairs, and unguarded heights. To help prevent falls, use non-skid rugs and mats, keep hallways and rooms uncluttered (*Figure 17*), clean up spills as soon as they happen, and take precautionary measures when using ladders or stools.



*Figure 17.* Small things laying around the house can have serious consequences. It is important to be vigilant.

## Choking

Food is the main cause of most choking accidents. Avoid choking by chewing foods slowly, don't talk while eating, and avoid drinking too much alcohol before or during meals. If you are able to do abdominal thrusts, do this to clear the airway. Even if you clear the airway, it is good to check with medical personnel to see if any damage has been done. If you are alone and can't speak, still call 9-1-1 as the one answering the call is trained to help you even if you can't talk.

## Fire

Prepare yourself and your home to reduce the risk of injury from fire and smoke. Keep flammable objects away from the stove or heaters. Check to make sure your residence has properly working smoke alarms. They should be on every floor of your home and you should change the batteries once a year. Keep a fire extinguisher in an easily accessible place, learn how to use it, and periodically check to make sure it is working properly. Make sure each bedroom has two exits from which you and your family can escape safely. Create a fire escape plan and practice it.

If you have a fire in your home, never open a door that feels hot. If you must go through smoke, crawl low and cover your mouth and nose with a moist towel if possible. Once out, stay out and let the fire department rescue others.

## Guns

The perception that the threat of home invasion is a reason to keep a gun for protection is shared by some people. Research has found that keeping a gun in the home significantly increases the risk of injury or death of people who live in the home. Incidences of suicide, homicide, and accidental injuries caused by firearms increase significantly when guns are kept in the home.

If you own guns and keep guns in your home, take practical measures to keep yourself, your family, and your friends safe:

- Keep guns out of sight of children
- Put guns unloaded in a locked cabinet or room
- Store ammunition separately

## Violence Prevention

The Centers for Disease Control (CDC) reports that violence is a serious public health problem resulting in more than 19,100 victims of homicide and over 1.5 million people treated in emergency rooms for an assault-related injury in 2019 ([www.cdc.gov/violenceprevention](http://www.cdc.gov/violenceprevention)). One major national initiative to try to curb violence is UNITY, a joint project of the CDC and the Prevention Institute ([www.preventioninstitute.org](http://www.preventioninstitute.org)). The aim of UNITY is to build support for efforts to prevent violence before it occurs so youths living in major cities can be safe and have opportunities to succeed. We discussed ways to prevent and deal with sexual violence in the healthy sexuality chapter.

## Brain Injury

Brain injury can include brain bleeds, brain swelling, concussions, severe diffuse axonal injury, and brain stem injury among others. Basically, trauma to the brain causing damage usually comes from external forces such as car crashes or contact sports. An open head injury would usually result in profuse bleeding because an object breaks open the skull.

Mild brain injury may result in no loss of consciousness but some confusion or dazed feelings. More traumatic brain injuries will result in loss of consciousness or eventual coma.

# LIFE'S HAPPY CHALLENGES

There are times and conditions in life that require us to apply additional insight to assure we are living a healthy lifestyle. These are not necessarily disruptions caused by illness—they can be naturally occurring situations like pregnancy, raising children, or aging.

## Pregnancy

Your healthy choices will greatly benefit your unborn child. Smoking, drug use, and excessive use of alcohol can have very detrimental effects on the developing fetus.

Eating well and maintaining a wise level of physical activity are vitally important. Regarding your exercise, consult with your physician about the types of activities and the intensity that is recommended for you. If you are normally quite active, this should enhance your whole experience during pregnancy and the delivery of your child (*Figure 18*).



**Figure 18.** Physical activity before and during your pregnancy is good for both you and your baby. Check with your doctor about any modifications you may need to make to your activities at different stages of your pregnancy.

Some women are able to maintain their usual intensity of exercise and others need to modify theirs. Your exercise intensity may vary from pregnancy to pregnancy. This is a very individual matter and should be supervised by your obstetrician. Wisdom would say to avoid high-risk activities in which you or your unborn child might be injured. This also is probably not a good time for extreme changes in your usual level of activity.

Your thoughts, feelings, and relations with others can also affect your unborn child. An atmosphere free of conflict and contention will have a positive effect. Well-chosen music can also positively influence the normal growth of babies.

Your ability to relax, be calm, and be happy may also make a difference. Getting adequate sleep will be a challenge, especially in the first and third trimesters. Learn what you can do to maximize your sleep.

Certainly, there are conditions and influences beyond your control. The most important thing is for you to find supportive people whom you can trust and you know have your best interests in mind. You doing your best for your baby is all you can do. Be gentle with yourself, keep your priorities straight, and this should be one of life's finest experiences for you and your family.

## Raising Children

Today we are faced with great challenges to raising healthy children. As we have discussed, the obesity levels and numbers of children being diagnosed with diabetes are at an all-time high. It certainly is a time to be especially diligent in feeding your children properly. If breastfeeding is an option, it may be advantageous to both the mother's and the child's well-being.

It is also important to reflect to your children, in your attitude and behavior, that physical activity is playful and fun. Children are less apt to be motivated by doing things to be healthy than they are by just plain fun. Taking the drudgery approach to healthy living out of all aspects of life will certainly help yourself and your children. Whatever you do, get the children moving. Find ways for you to enjoy an activity together and activities they can do with other children. Help them develop skills that will allow them to be successful in physical activities as they grow older. This will help them physically, mentally, emotionally, and socially. Competitive sports may or may not be of interest to your child, but everyone can learn to enjoy some kind of physical activity.

## Aging

How is it possible to have a positive attitude toward aging? If you know someone who is over 65 years of age who has stayed physically active throughout his or her life, you can see that the expected frailty that is thought to accompany aging is just not there. Aging does not automatically result in a loss of strength, flexibility, or cardiorespiratory capacity.

Most people do not realize this basic fact put forth by the Agency for Healthcare Research and Quality (AHRQ) of the U.S. Department of Health & Human Services (HHS): "Few factors contribute as much to successful aging as having a physically active lifestyle."

Not that much physical activity is needed to have beneficial effects, especially in the elderly. A little activity goes a long way, and it is never too late to start. Being physically active also allows an older person to cope with and not be debilitated by health problems. Twenty to 30 minutes of moderate activity a day is all that is needed to enjoy health benefits. If an older person can also do a more vigorous activity, this is all the better.

The elderly need to be vigilant about nutrition and be especially careful to not over-medicate. Care must be taken to avoid turning to alcohol or similar escapes when dealing with the loss of loved ones. Older people can stimulate their mental curiosity by reading, writing, or learning new hobbies.

Reducing distress and being positive about the purpose of life are very important. Be grateful for whatever emotional support you can give to the elderly. Their health will be enhanced by their gratitude for this support from family and friends. Aging may not be all that negative if you stay physically active and enjoy it. There is no need to fear aging. Stay physically active throughout your entire life and you will surely reap the benefits every day and as you age.

## THE SCIENCE OF HAPPINESS

Concluding on a happy note is a good idea, don't you think? Dr. Dan Baker was the founding director of the Life Enhancement Center at Canyon Ranch Health Resort. He is a medical psychologist and a proponent of positive psychology.

He teaches people to be happy! According to Dr. Baker, the three major components of life are (1) relationships, (2) health, and (3) purpose, which for many people is their work. We are most likely to be happy if we can keep these three components of life in balance.

Quoting Dr. Jesse Williams, M.D., Baker defines health as “the optimal condition of being that allows for the ultimate engagement with life.” From this, Baker concludes that feeling healthy starts with being grateful for the health that you have. You then show your gratitude by doing what you can with what you have (*Figure 19*). Our health contributes significantly to our mood. Poor diet, not being physically active, and excessive alcohol all contribute to negative moods.



**Figure 19.** Happiness cannot be bought or forced; it comes from within, and you cannot help but share it with others.

Healthy living contributes significantly to positive moods that are necessary if a person is going to be happy. Tools that we can develop to enhance happiness include being grateful or feeling appreciation, choosing the course of your life, realizing that your life belongs to you and you can do something about it (personal power), leading with your strengths rather than focusing on your weaknesses, using positive language about yourself and in relations with others, and balancing the three components of life—relationships, health, and purpose.

Baker lists the following five happiness traps, which breed fear, pessimism, spiritual emptiness, self-absorption, purposelessness, and illness:

1. Trying to buy happiness
2. Trying to find happiness through pleasure
3. Trying to be happy by resolving the past
4. Trying to be happy by overcoming weaknesses
5. Trying to force happiness

When our lives reflect the qualities of happiness, we love life and happiness finds us. These qualities include love, optimism, health, courage, a sense of freedom, proactivity, spirituality, altruism, a good sense of humor, purpose, and security. Baker says that “happy people know that security is an inside job” and “happy people are not afraid to go beyond the boundaries of their own lives. They are not concerned about dying—they are concerned about not living.” In his book *What Happy People Know*, he has pulled together a composite of much of what we have discussed in this book and put it into the context of happiness.

Can we hope to be happy for a lifetime? Certainly, this is possible. By design, life will always have its challenges, difficulties, and seemingly overwhelming hardships. Being happy does not mean an absence of these obstacles. Happiness comes when we are grateful to be who we are, and we value living a healthy lifestyle, having positive relationships, and knowing our life has purpose and meaning. These are all in our hands. Good health and happiness to you and yours throughout your lifetime!

## MOVING FORWARD

Having completed this chapter, expected outcomes include

1. Develop personal financial practices that promote all dimensions of your well-being.
2. Prepare for an occupation that enables you to live a balanced and fulfilled life.
3. Develop the skills and make a commitment to being physically active now and throughout your life. Make your own commitment to living a healthy lifestyle.
4. Be aware of environmental factors that affect your healthy lifestyle.
5. Be happy and enjoy living your healthy lifestyle!

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