HLTH-101: CONTEMPORARY HEALTH ISSUES



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HLTH-101: Contemporary Health Issues

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This text was compiled on 06/07/2026

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SECTION OVERVIEW

1.1: Promoting Good Health

Learning Outcomes

By the end of this chapter you will be able to:

- Describe the Nine Dimensions of Wellness
- Identify positive actions you could take to increase your wellness in each of the dimensions.
- Employ the skills of Health Literacy
- Explain the leading causes of death along with the risk factors
- Utilize SMART goal setting and action planning for behavior change

Are you healthy?

What does being healthy mean to you?

Have you tried setting healthy New Years goals? Did it work?

Welcome to Health! I hope you enjoy learning this information. Please read the required chapters for each module, then use information from your reading in your discussion and reflection posts.

As you read this book, you will be taken on a learning journey that will continually ask you to reflect on your own life, your health, your wellness, your choices, and your behaviors. Health is a topic that impacts all of us, thus this learning journey is personal to you and your life experiences.

1.1.1: What does Health and Wellness mean?

1.1.2: A Healthy Population

1.1.3: Healthy People

1.1.4: Taking Charge of Your Health- Making Healthy Changes

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1.1.1: What does Health and Wellness mean?

How have you used the word Health or Wellness in your communication with others? The terms Health and Wellness are often used interchangeably. What do they mean to you?

Activity: Healthy versus Unhealthy

What do you mean by healthy and unhealthy?

- Take a piece of paper and fold it in half.
- On one side of the paper write “healthy” and the other side write “unhealthy”
- Either make a list or draw pictures of what you consider healthy and unhealthy.

As you review the following information about the wellness, see if you have an opportunity to expand your list or drawings for aspects of health that may be missing from your list.

The World Health Organization (WHO) defines health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (illness)” and defines wellness as “the optimal state of health of individuals and groups, [1]” which may be expressed as “a positive approach to living.” The National Wellness Institute[2], explains wellness as “an active process through which people become aware of, and make choices toward, a more successful existence.”

The National Wellness Institute states that there is general agreement that:

1. Wellness is considered a conscious, self-directed and evolving process of achieving full potential.
2. Wellness is multidimensional and holistic, encompassing lifestyle, mental and spiritual well-being, and the environment.
3. Wellness is positive and affirming.

The primary difference between health and wellness is that health is your state of being, or a goal to achieve, and wellness is the active process of achieving it through growth and change. Through wellness we hope to reach our fullest potential of health and well-being.

The Nine Dimensions of Wellness

Both health and wellness are very broad terms. To help identify ways we can grow and change to reach our optimal health, it is helpful to view wellness in terms of the Nine Dimensions of Wellness. The Nine Dimensions of Wellness can help to identify ways you can make wellness a part of your everyday life.

The Nine Dimensions of Wellness include: Physical, Emotional, Social, Environmental, Financial, Intellectual, Occupational, Spiritual, and Cultural. These dimensions of wellness are not isolated, but rather are interconnected. Problems or challenges in one dimension can impact the other, while the opposite can also be true, that by improving your health and wellness in one area can help to improve other dimensions. For example, your emotional wellness can be positively impacted through exercise (physical wellness) but negatively impacted by financial struggles that often lead to high stress.

Reflection Opportunity: My Wellness Ratings and Actions

As you read through the following Nine Dimensions of Wellness, give yourself a score from 1 (low) to 10 (high) for your level of wellness in each dimension. Along with your score, also record a list of possible behaviors you could change or actions you could take that would increase your wellness score for each dimension.

For example:

“For Physical Wellness I would give myself a score of [insert your score 1 being low] out of 10. I could increase this score by either changing or implementing the following two behaviors: [insert a behavior you could change or an action you could take] and [insert a behavior you could change or an action you could take]”

Physical Wellness

People who are focused on improving their physical health recognize the need for regular physical activity, they choose healthy foods, go to the doctor, and get adequate sleep. People who are physically well actively make healthy decisions on a daily basis.

This may include making a habit of exercising three to five times per week or recording their dietary intake to ensure they are receiving proper nutrition for optional health.

How would you rate your physical wellness and what behaviors could you change, or actions could you take, to positively improve your physical wellness?

Emotional Wellness

Coping effectively with life and expressing emotions in an appropriate manner are keys to emotional wellness. An emotionally well person successfully expresses and manages an entire range of feelings, including anger, doubt, hope, joy, desire, fear, and many others. People who are emotionally well maintain a high level of self-esteem. They have a positive body-image and the ability to regulate their feelings. They know where to seek support and help regarding their mental health, including but not limited to, seeking professional counseling services.

How would you rate your emotional wellness and what behaviors could you change, or actions could you take, to positively improve your emotional wellness?

Social Wellness

People who are focused on their social wellness are striving for positive relationships, developing a sense of connection, belonging, and sustained support system. A socially well person builds healthy relationships based on interdependence, trust, and respect. Those who are socially well have a keen awareness of the feelings of others. They develop a network of friends and co-workers who share a common purpose, and who provide support and validation.

How would you rate your social wellness and what behaviors could you change, or actions could you take, to positively improve your social wellness?

Environmental Wellness

Environmental wellness includes a desire to positively impact our planet Earth and also our local community by striving to occupy pleasant, healthy, and safe environments that support well-being and positively impact the quality of our surroundings (including protecting and preserving nature). An environmentally well person appreciates the external cues and stimuli that an environment can provide . People who have achieved environmental wellness recognize the limits to controlling an environment and seek to understand the role an individual plays in the environment.

How would you rate your environmental wellness and what behaviors could you change, or actions could you take, to positively improve your environmental wellness?

Financial Wellness

Financial wellness refers to achieving satisfaction with current and future financial situations by handling finances wisely. Those who are financially well are fully aware of their current financial state. They set long- and short-term goals regarding finances that will allow them to reach their personal financial goals.

How would you rate your financial wellness and what behaviors could you change, or actions could you take, to positively improve your financial wellness?

Intellectual Wellness

Intellectual wellness includes being open-minded, recognizing creative abilities, and/or finding ways to expand knowledge and skills. Those who enjoy intellectual wellness engage in lifelong learning. They seek knowledge and activities that further develop their critical thinking and heighten global awareness. They engage in activities associated with the arts, philosophy, and reasoning.

How would you rate your intellectual wellness and what behaviors could you change, or actions could you take, to positively improve your intellectual wellness?

Occupational Wellness

Occupational wellness refers to personal fulfillment and enrichment from one’s work and/or responsibilities. An occupationally well person enjoys the pursuit of a career which is fulfilling on a variety of levels. This person finds satisfaction and enrichment in work, while always in pursuit of opportunities to reach the next level of professional success.

How would you rate your occupational wellness and what behaviors could you change, or actions could you take, to positively improve your occupational wellness?

Spiritual Wellness

Spiritual wellness refers to having a sense of purpose and meaning in life, this may come from establishing peace, harmony, and balance in our lives. People who can be described as spiritually well have identified a core set of beliefs that guide their decision making, and other faith- based endeavors. While firm in their spiritual beliefs, they understand others may have a distinctly different set of guiding principles. They recognize the relationship between spirituality and identity in all individuals.

How would you rate your spiritual wellness and what behaviors could you change, or actions could you take, to positively improve your spiritual wellness?

Cultural Wellness

Cultural wellness refers to the way you interact with others who are different from you. This includes understanding and celebrating our differences. Culturally well people are aware of their own cultural background, as well as the diversity and richness present in other cultural backgrounds. Cultural wellness implies understanding, awareness and intrinsic respect for aspects of diversity. A culturally well person acknowledges and accepts the impact of these aspects of diversity on sexual orientation, religion, gender, racial and ethnic backgrounds, age groups, and disabilities

How would you rate your cultural wellness and what behaviors could you change, or actions could you take, to positively improve your cultural wellness?

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1.1.2: A Healthy Population

How long would you like to live? What would you like to be able to do throughout life, especially into your later years? Striving for health by implementing wellness practices will impact both your quantity and quality of life.

Leading Causes of Death in the United States

Across the entire U.S. population, Cardiovascular Disease and Cancer are the top two causes of death. However, variation exists for age and ethnicities. For example, until age 44 the leading cause of death is unintentional injuries, then between 45-64 the leading cause of death is Cancer followed by Cardiovascular disease, and beginning at age 65 Cardiovascular Disease takes the number one rank[3].

Table 1.1.2.1 includes the top ten causes of death for the years 1900, 1950, 2000, 2010, 2018, and 2020. 2018 was purposefully included to show the difference in causes of death pre-COVID. In 2020, the list of the top causes shows COVID* taking the spot for the third most deaths. As you review the data in Table 1.1.2.1, it is helpful to compare the leading cause of death with life expectancy. The life expectancy in 1900 was 48.3 years, by 1950 life expectancy increased to 71.1 years, and from 2010 to 2018 life expectancy remained fairly stable at 78.7 years. From 1900 to 2000, life expectancy almost doubled and the causes of death changed from causes predominantly related to infectious diseases and sickness, to causes of death highly related to lifestyle choices, like the choice to eat a healthy diet and stay physically active.

Table 1.1.2.1: Leading Cause of Death 1900, 1950, 2000, 2010, 2018, 2020. Mortality Data from the CDC

Rank	Cause of death 1900	Cause of death 1950	Cause of death in 2000	Cause of death in 2010	Cause of death in 2018	Cause of death in 2020
1	Pneumonia and Influenza: 40,362	Diseases of the heart: 535,705	Heart disease: 710,760	Heart disease: 597,689	Heart disease: 655,381	Heart disease: 696,962
2	Tuberculosis: 38,820	Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues: 210,705	Cancer: 553,091	Cancer: 574,743	Cancer: 599,274	Cancer: 602,350
3	Diarrhea, enteritis, and ulceration of the intestines: 28,491	Vascular lesions affecting central nervous system: 156,751	Stroke (cerebrovascular diseases): 167,661	Accidents (unintentional injuries): 167,127	Accidents (unintentional injuries): 167,127	*COVID-19: 350,831
4	Diseases of the heart: 27,427	Accidents: 91,249	Chronic lower respiratory diseases: 122,009	Chronic lower respiratory diseases: 138,080	Chronic lower respiratory diseases: 159,486	Accidents (unintentional injuries): 200,955
5	Intracranial lesions of vascular origin: 21, 353	Certain diseases of early infancy: 60,989	Accidents (unintentional injuries): 97,900	Stroke (cerebrovascular diseases): 129,476	Stroke (cerebrovascular diseases): 147,810	Stroke (cerebrovascular diseases): 160,264

Rank	Cause of death 1900	Cause of death 1950	Cause of death in 2000	Cause of death in 2010	Cause of death in 2018	Cause of death in 2020
6	Nephritis: 17,699	Influenza and pneumonia, except pneumonia of newborn: 47,120	Diabetes: 69,301	Alzheimer's disease: 83,494	Alzheimer's disease: 122,019	Chronic lower respiratory diseases: 152,657
7	All accidents: 14,429	Tuberculosis: 33,959	Influenza and pneumonia: 65,313	Diabetes: 69,071	Diabetes: 84,946	Alzheimer's disease: 134,242
8	Cancer and other malignant tumors: 12,769	General arteriosclerosis: 30,734	Alzheimer's disease: 49,558	Nephritis, nephrotic syndrome, and nephrosis: 50,476	Influenza and pneumonia: 59,120	Diabetes: 102,188
9	Senility: 10,015	Nephritis: 24,677	Nephritis, nephrotic syndrome, and nephrosis: 37,251	Influenza and pneumonia: 50,097	Nephritis, nephrotic syndrome, and nephrosis: 51,386	Influenza and pneumonia: 53,544
10	Diphtheria: 8,056	Diabetes mellitus: 24,419	Intentional self-harm (suicide): 31,224	Intentional self-harm (suicide): 38,364	Intentional self-harm (suicide): 48,344	Nephritis, nephrotic syndrome, and nephrosis: 52,547
						Intentional self-harm (suicide): 45,855

Reflection: Quantity and Quality of Life Then and Now

Have you been able to trace your family tree? If you are able to trace your history back in time, something you might notice is how long each of your relatives lived. Did you know that those born in 1900 lived on average just 47.3 years and by 2000 on average Americans lived to 76.8 years[4]? Life expectancy almost doubled in just one century.

Life expectancy is often used a measurement of the overall health of a population. Life expectancy at birth represents the average number of years that a group of infants would live if the group were to experience the age-specific death rates present in the year of birth. Life expectancy averages vary based on many different demographics such as between males and females and regions of the world. Take a moment to review the world life expectancy charts provided by Our World in Data[5]

Have you thought about what actions took place, or healthy goals were achieved, to be able to double life expectancy?

In the early 1900's, the leading cause of death was infectious diseases, now the leading cause of death is two chronic diseases, cardiovascular disease and cancer. As a nation and world, several actions were implemented to reduce death from infectious diseases, these actions include clean drinking water, development of medications, development and requirement of vaccines, workplace safety such as wearing hard hats, vehicle safety such as wearing seatbelts.

Read about the Ten Great Public Health Achievements — United States, 2001–2010[6]

Reflection: Take a moment and think about how your life would have been different if you were born in 1900. What would your daily life be like? What challenges might you face? What might you wish you had that has not been developed yet? Ask yourself what you have now that you would not have had in the early 1900's that has increased your quantity and quality of life?

Your Choices, Your Risk: What is your risk factor?

Many of the risk factors for Cardiovascular Disease and Cancer are related to your lifestyle choices, thus the choices you make may impact your chances of being diagnosed with Cardiovascular Disease and Cancer. Part of learning how to take charge of your health requires understanding your risk factors for different diseases. Risk factors are things in your life that increase your chances of getting a certain disease. Some risk factors are beyond your control, you may be born with them or exposed to them through no fault of your own.

Some risk factors that you have little or no control over include your:

- Family history of a disease
- Sex/gender — male or female
- Ancestry

Some risk factors you can control include:

- What you eat
- How much physical activity you get
- Whether you use tobacco
- How much alcohol you drink
- Whether you misuse drugs
- Whether you get good sleep

You can have one risk factor for a disease or you can have many. The more risk factors you have, the more likely you are to get the disease. For example, if you eat healthy, exercise on a regular basis, and control your blood pressure, your chances of getting heart disease are less than if you are diabetic, a smoker, and inactive. To lower your risks, take small steps toward engaging in a healthy lifestyle, and you'll see big rewards.

People with a family health history of chronic disease may have the most to gain from making lifestyle changes. You can't change your genes, but you can change behaviors that affect your health, such as smoking, inactivity, and poor eating habits. In many cases, making these changes can reduce your risk of disease even if the disease runs in your family. Another change you can make is to have screening tests, such as mammograms and colorectal cancer screening. These screening tests help detect disease early. People who have a family health history of a chronic disease may benefit the most from screening tests that look for risk factors or early signs of disease. Finding disease early, before symptoms appear, can mean better health in the long run.

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1.1.3: Healthy People

We want people to be healthy. A healthy population is a nations greatest resource, it means a productive population, a prosperous population, and a healthy economy. Your individual commitment to striving for personal wellness may contribute to our national goals for a healthy population!

Every decade since 1980, the U.S. Department of Health and Human Services (HHS) has published healthy goals for our U.S. population called the Healthy People initiative. Healthy People 2030 is the 5th iteration of the Healthy People initiative. The Healthy People initiative is designed to guide national health promotion and disease prevention efforts to improve the health of the nation.

The 2030 broad goals for this decade include the following:

- Attain healthy, thriving lives and well-being, free of preventable disease, disability, injury and premature death.
- Eliminate health disparities, achieve health equity, and attain health literacy to improve the health and well-being of all.
- Create social, physical, and economic environments that promote attaining full potential for health and well-being for all.
- Promote healthy development, healthy behaviors and well-being across all life stages.
- 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.

The five broad goals are further divided into over 400 objectives: 355 core objectives, 115 developmental objectives and 40 newly added research objectives. The science-based objectives include targets to monitor progress and motivate action. The Healthy People 2030 objectives were carefully chosen based on national data. The goal is to work together as a nation to achieve the achieve the objectives and goals to hopefully improve health and well-being nationwide.

Challenge: Healthy People Goals and You

How might you benefit from the work being done to achieve the Healthy People goals?

Go to the Healthy People website and browse the Healthy People Objectives

Your challenge is to find an objective that either impacts you or a loved one, or is something that you have been curious about.

Click on the objective and begin by reading the overview to gain a better understanding of what they are hoping to achieve and then navigate to the menu item titled Healthy People In Action to see how communities across the nation are working to achieve the goal. You can then review the Evidence Based Resources to see if you can locate helpful evidence-based resources to achieve the objective.

Health Literacy

The internet brought us the ability to have a wealth of information at our fingertips. Have you ever felt sick and googled your symptoms to try to self-diagnose your sickness? Have you been scrolling through your social media and an article popped up promising a cure to obesity with just one simple pill?

With so much information available to us, it is imperative that we understand how to critically evaluate information we see or hear. The need to be critical consumers of information is reflected in the Healthy People broad goal to “eliminate health disparities, achieve health equity, and attain health literacy to improve the health and well-being of all.” We need to increase our health literacy.

The CDC defines personal health literacy as the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others[7]. We must be critical consumers of information which starts with evaluating the source of the information.

Evaluating and Finding Health Information

One strategy for assessing a website is to use the CRAAP[8] method which stands for Currency, Relevance, Authority, Accuracy, and Purpose.

As you read information critically, ask yourself the following questions:

Currency: The timeliness of the information.

- When was the information published or posted?
- Has the information been revised or updated?
- Does your topic of interest require current information, or will older sources work as well?
- Are the links functional?

Relevance: The importance of the information for your needs.

- Does the information relate to your topic or answer your question?
- Who is the intended audience?
- Is the information at an appropriate level (i.e. not too elementary or advanced for your needs)?
- Have you looked at a variety of sources before determining this is one you will use?
- Would you be comfortable citing this source in a research paper?

Authority: The source of the information.

- Who is the author/publisher/source/sponsor?
- What are the author's credentials or organizational affiliations?
- Is the author qualified to write on the topic?
- Is there contact information, such as a publisher or email address?
- Does the URL reveal anything about the author or source? examples: .com .edu .gov .org .net

Accuracy: The reliability, truthfulness and correctness of the content.

- Where does the information come from?
- Is the information supported by evidence?
- Has the information been reviewed or refereed?
- Can you verify any of the information in another source or from personal knowledge?
- Does the language or tone seem unbiased and free of emotion?
- Are there spelling, grammar or typographical errors?

Purpose: The reason the information exists.

- What is the purpose of the information? Is it to inform, teach, sell, entertain or persuade?
- Do the authors/sponsors make their intentions or purpose clear?
- Is the information fact, opinion or propaganda?
- Does the point of view appear objective and impartial?
- Are there political, ideological, cultural, religious, institutional or personal biases?

Examples of Trusted Source of Health Information

The following is a short list of websites that are most likely to pass the CRAAP test for health information:

- The Center for Disease Control and Prevention
- World Health Organization
- PubMed Central (PMC) is a free full-text archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health's National Library of Medicine (NIH/NLM).
- MyHealthFinder is a prevention and wellness resource that includes evidence-based health information in English and Spanish that's actionable and easy to use.
- U.S. Department of Health and Human Services

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1.1.4: Taking Charge of Your Health- Making Healthy Changes

The choices you make each day can impact your quality and quantity of life. At the beginning of this chapter you were invited to reflect on your health across the Nine Dimensions of Wellness by giving yourself a score from 1-10 that would reflect your health in each dimension from low to high. You were also invited to identify possible behaviors you could change that would positively impact your health in each dimension. This is a very helpful activity for helping you to identify what you can do to stay healthy throughout life. The first step in any behavior change is to recognize what you can and should change.

Are you ready to change your behaviors?

You may be able to quickly identify behaviors your could change to increase your wellness, but you might not be able to quickly begin implementing the change. Are you ready to change your unhealthy behaviors?

The Stages of Change, also called the Transtheoretical model of behavior change, was developed by Prochaska and DiClemente to help understand the stages a person goes through when trying to make changes in their life. It assesses an individual's readiness to implement a healthier behavior, and provides insight into the decision-making process that leads to action. The five stages include: precontemplation, contemplation, preparation, action, and maintenance. You might not go through the stages linearly, rather you might find yourself moving between them, and regressing. For example, you might first believe you are in the Preparation Stage and then realize you are actually in the Contemplation stage. Or you might jump into the Action stage beginning the change, and then discontinue with your plan stepping back into the Preparation or Contemplation stage.

As you review the five stages of the Stages of Change, along with characteristics and strategies[9], think about a behavior you'd like to change and identify which stage you are currently in and what you could do to move to the next stage:

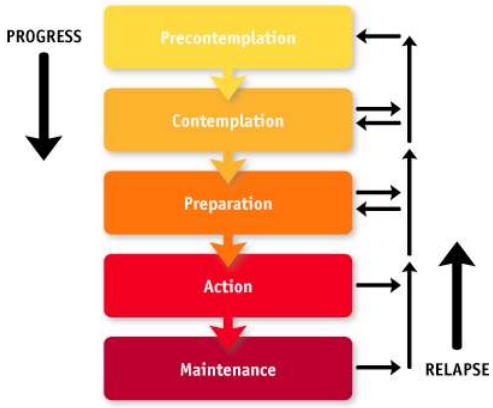


Figure 1.1.4.1: Stages of Change

Precontemplation Stage (not ready to change):

People in the precontemplation stage are not intending to take action in the foreseeable future, are not interested in getting help, and can be unaware or do not believe that their behavior is problematic.

- Characteristics: Ignoring or ignorance of the problem, or denying the problem exists.
- Strategies to move to next stage: Identify the risks to your life if you do not change and take time to analyze or rethink your behaviors and action.

Contemplation Stage (getting ready to change):

People in the contemplation stage are beginning to recognize that their behavior is problematic, be more aware of the consequences of their behavior, and start to look at the pros and cons of either continuing or changing their behavior. They be more accepting or receptive to information about their unhealthy behavior and more open to learn about ways they could change.

- Characteristics: Being doubtful or ambivalence of the change, or having conflicted emotions about the change.
- Strategies to move to next stage: Make a list of the pros and cons of changing your behavior, identify barriers to changing and strategies you could use to overcome the barriers, lastly look for resources that could help you make the change.

Preparation Stage (ready to change):

People in the Preparation stage are intending to take action in the immediate future, they are committed to making changes, and may begin taking small steps toward behavior change by researching to find resources or strategies to help them with their change. This stage likely includes the development of a behavior change plan.

- Characteristics: Experimenting with small changes and collecting information about the change.
- Strategies to move to next stage: Write down your goals, prepare a plan of action, and make a list of motivating statements.

Action Stage (actively changing):

People in the action stage believe they can change and are actively changing their behaviors. They are open to help, seek support, and work to overcome barriers to stay committed.

- Characteristics: Direct action toward goal.
- Strategies to move to next stage: Reward your successes and seek out social support.

Maintenance Stage (maintain change):

People in the maintenance stage have been able to sustain action for at least six months and are working to prevent relapse into previous unhealthy behaviors.

- Characteristics: Maintenance of the new behavior and avoiding temptations.
- Strategies to prevent relapse: Developing positive coping strategies for overcoming temptations and remember to continue to reward yourself.

Making the Change with SMART Goal Setting

Have you ever tried to change your behaviors? Maybe you set a New Years Resolution? How did it go?

If you have been successful at changing your behaviors it is highly likely that you followed a very specific plan. If you haven't been successfully, you likely followed a path similar to what many people do around January first each year which is make broad statements such as "I am going to lose weight this year" or "this is the year I am going to work out" or "I am going to get healthy." Each of these statements have a good intent, but are lacking an actual goal or target to achieve. It is like saying you are taking a vacation but haven't made any plans, haven't decided where to go, or how you will get there.

Setting SMART goals can help you to have a better chance at being successful with behavior change by giving you direction and a target to achieve. SMART stands for Specific, Measurable, Attainable/Achievable, Realistic, Time-oriented.

Setting a SMART goal requires the goal setter to think about the factors involved in achieving their goal. Defining each of the five characteristics can help to define a pathway to reaching the goal. The more well-defined that pathway becomes, the easier it is to follow.



Figure 1.1.4.2: SMART Goals

Specific

Create a goal that has a focused and clear path for what you actually need to do. The goal needs to be concrete, detailed, and well defined so that you know where you are going and what to expect when you arrive. What do you want to accomplish? Why have you set this goal?

Measurable

Create a goal that provides means of measurement and comparison by using numbers and quantities, this enables you to track your progress. Including measurement lets you know whether or not you have met your goal. How will you measure your progress?

How will you know when you have successfully achieved your goal?

Attainable/Achievable

Make sure that your goal is within your capabilities and not too far out of reach. For example, if you have not been physically active for a number of years, it would be highly unlikely that you would be able to achieve a goal of running a marathon within the next month. Your goal must be feasible and easy to put into action. Do you have the skills, abilities, or time needed to achieve your goal?

Realistic/Relevant

When deciding on your goal considers constraints such as resources, personnel, and cost. Try to ensure that your goal is something you will be able to continue doing and incorporate as part of your regular routine/lifestyle. For example, if you made a goal to kayak 2 times each week, but don't have the financial resources to purchase or rent the equipment, no way to transport it, or are not close enough to a body of water in which to partake in kayaking, then this is not going to be feasible. Why do want to achieve the goal? Is your goal in line with your lifestyle?

Time-Oriented/Time-Bound/Timely

A time frame helps to set boundaries around the objective. Give yourself a target date or deadline in which the goal needs to be met. This will keep you on track and motivated to reach the goal, while also evaluating your progress. What is your timeline to change?

Moving from Broad to SMART Goals

Here's are examples of changing from a vague goal to a SMART goal:

- Change "I will workout" to "I will engage in 30 minutes of aerobic physical activity 5 days a week for the next 4 weeks."
- Change "I will lose weight" to "I will lose weight by tracking my calories every day for the next 2 months and reducing my calorie intake by 10% each week beginning week 1 with 2,000 calories/day intake, week 2 calorie intake 1,800 calories/day, week 3 calorie intake 1,620 calories/day, etc."
- Change "I will be happier" to "I will increase my happiness by incorporating positive affirmations into my daily life. For the next two months I will begin week 1 with choosing one positive affirmation that I will repeat to myself five times a day. Each subsequent week I will add another affirmation so that by week 8 I am repeating 8 positive affirmations five times a day."
- Change "I will go to the gym" to "I will increase my physical activity by doing cardio and weight training at the gym four times a week for the next 10 weeks. I will track my progress by keeping a workout log. I will increase cardio time and weight training reps/sets each week by 5-10%"

Practice Setting SMART Goals

What is a broad goal you would like to achieve? For example, have you said to yourself or others, "I want to lose weight," or "I want to eat better."

Identify a broad goal you would like to achieve and practice changing it to a SMART goal that is Specific, Measurable, Attainable/Achievable, Realistic/Relevant, and Time-oriented/time-bound.

Use might find the following template helpful for developing your SMART goals:

"I will [what is your goal?] by [what will you do? where will you do it? when will you do it?]. I will track my progress by [how will you measure the goal?] for [how long will you do this?]."

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1.1.5: Taking Charge of your health - Making Healthy Changes

Increase Your Opportunity for Successful Change

Behavior change is hard for many reasons. Here are some strategies to help increase your chances of successfully achieving your health and wellness goals.

Set approach goals instead of avoidance goals[10]

Approach goals are goals where you are taking actions to meet a desired outcome, whereas avoidance goals are focused on not taking actions. Research has shown that we are more successful when we set approach goals rather than avoidance goals. For example, rather than setting an avoidance goal such as “I will not drink soda” the focus could be “I will drink water instead of soda.”

Set mastery (learning) goals instead of performance goals[11]

A performance goal might be to lose 20 pounds, whereas a mastery (learning) goal would focus on the actions you are taking to lose weight, such as focusing on your nutrition or exercise. A mastery skill involves increasing existing abilities or learning new skills. Performance goals may be less effective than mastery goals. It is ok to set a performance goal, but it should always be accompanied by a mastery goal.

Find Your Why

Take a moment to think about why you want to change. How will this change make your life better? How will this change help you feel better, have better relationships with yourself and others, or help your family or friends? You might like to refer to this as finding or discovering your why.

Your Daily Action Plan

If you think about your SMART goal as your destination, how will you get there and what are the directions or what route will you take? Developing an action plan is a helpful strategy to increase your motivation. An action plan specifies the what (always a behavior), how much, how often, and usually when (which days and times), in other words it is the steps by which the SMART goal will be achieved. Your action plan provides you with your goal for each day allowing you to focus on your day-to-day actions rather than just on your long term goal. This allows you to be successful each day that you complete your stated actions in your action plan.

Boost Your Self Efficacy

Implementing a carefully and thoughtfully crafted action plan can help to improve health and build your self efficacy[12]. Self-Efficacy is the confidence in one’s ability to achieve a specific goal, it is the belief in oneself that you can do it. Implementing and meeting the goals of your action plan is a great strategy for building your self-efficacy, which in turn builds your motivation to change.

A Positive Mindset

Having a positive mindset can also help to increase your self-efficacy. This might include focusing on positive self-talk whereby purposefully telling yourself that you can complete your goals. A positive mindset may also take the form of finding enjoyment in your changes. When the thought of your change brings you enjoyment, you are more likely to engage in the behavior change and stick to it[13].

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1.1.6: End-of-Chapter Material

Key takeaways for this Chapter

- Your health is your state of well-being.
- Wellness is the active process of achieving health through growth and change.
- Wellness is a broad concept and encompasses nine dimensions: Physical, Emotional, Social, Environmental, Financial, Intellectual, Occupational, Spiritual, and Cultural.
- A healthy population is a nations greatest resource, it means a productive population, a prosperous population, and a healthy economy.
- The top causes of death, cardiovascular disease and cancer, are highly impacted by your lifestyle choices.
- Increasing health literacy is an important skill to ensure people can find, understand, and use valid reliable information to make healthy decisions.
- Everyone is at a different readiness to change and can take steps to actively change unhealthy behaviors.
- Use SMART goal setting to change broad health goals into action oriented goals that you can achieve.

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1.1.7: Promoting Health- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

Fun Theory- Piano Stairs



How to change your behavior for the better



The best career path isn't always a straight line



The rise of predatory scams — and how to prevent them



Try something new for 30 days



Why some people find exercise harder than others



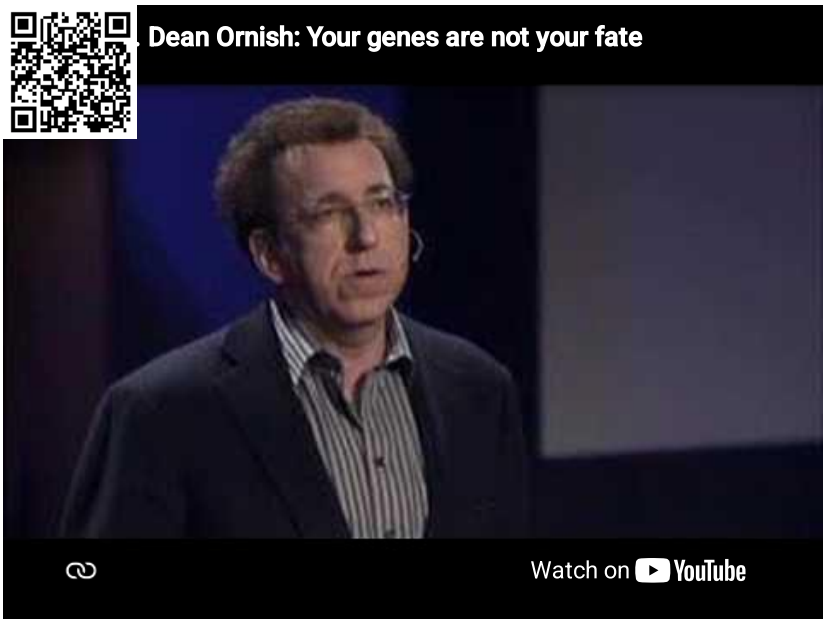
Lessons from the longest study on human development



How humanity doubled life expectancy in a century



Your genes are not your fate



The 1-minute secret to forming a new habit



The moral bias behind your search results



A simple way to break a bad habit



5 tips to improve your critical thinking



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SECTION OVERVIEW

1.2: Managing Emotional and Mental Health

Learning Outcomes

By the end of this chapter you will be able to:

- Describe what mental, emotional, and psychological health entails.
- Recognize warning signs of emotional distress
- Relate Maslow's Hierarchy of Needs to emotional health
- Recognize emotional defense mechanisms
- Describe types of anxiety disorders and treatments
- Explain incidence and signs of Depression

Do you feel you are living up to your potential?

Do you find opportunities throughout the day to focus on happiness?

Do you feel good about yourself?

Have you ever felt sad for a prolonged amount of time?

Have you, or do you know someone who has, felt depressed or had anxiety?

1.2.1: What is Mental Health?

1.2.2: Mental Illness

1.2.3: Challenges to our Mental Health

1.2.4: Mental Health Disorders

1.2.5: Developing and Protecting Individual Attributes

1.2.6: 2.11 Factors That Influence Psychological Well-Being

1.2.7: Mental Health - Risks, Causes, and Treatments

1.2.8: End-of-Chapter Material

1.2.9: Emotional and Mental Health- Optional Continued Learning

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1.2.1: What is Mental Health?

Mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community. Mental health includes our emotional, psychological, and social well-being. It affects how we think, feel, and act. It also helps determine how we handle stress, relate to others, and make choices. Mental health is important at every stage of life, from childhood and adolescence through adulthood. Mental health is fundamental to our collective and individual ability as humans to think, emote, interact with each other, earn a living and enjoy life. Although more emphasis is often placed on our physical wellness, mental and physical health are equally important components of overall health.

Although poor mental health and mental illness are terms that are often used interchangeably, poor mental health and mental illness are not the same. A person can experience poor mental health and not be diagnosed with a mental illness. Likewise, a person diagnosed with a mental illness can experience periods of physical, mental, and social well-being.

According to the World Health Organization:

- Mental health is more than the absence of mental disorders.
- Mental health is an integral part of health; indeed, there is no health without mental health.
- Mental health is determined by a range of socioeconomic, biological and environmental factors

Mental Health and Wellness

Your mental health is very important to your well-being. Just like we strive for to be physically healthy, we must also strive to be mentally, emotionally, and socially healthy.

Positive mental health allows people to:

- Cope with the stresses of life
- Be physically healthy
- Have good relationships
- Make meaningful contributions to your community
- Work productively
- Realize your full potential

Reaching Your Full Potential

What does it take to reach your full human potential, to become everything that you are capable of becoming? Is it important to have air, water, food, and shelter in order for you to strive to reach your human potential? Is it important to feel safe in order to reach your human potential?

In 1943 Abraham Maslow published one of the most cited theories of human behavior called Maslow's Hierarchy of Needs[1]. The purpose of the Hierarchy of Needs was to explain that there are levels of human needs and we need to focus on each of the levels in order to become everything that we are capable of becoming. Maslow's hierarchy of needs is often portrayed in the shape of a pyramid, with the most fundamental levels of needs at the bottom. Maslow developed the hierarchy with order of importance in mind, however noted that although it was observed that most people fulfilled their basic needs in the order of the hierarchy, there are some exceptions. The order of needs as categorized by Maslow from bottom to top are: physiological needs, safety, love and belonging, esteem, and self-actualization. Maslow acknowledged that many different levels of motivation are likely to be present in a human all at once. His focus in discussing the hierarchy was to identify the basic types of motivation and the order that they generally progress as lower needs are reasonably well met.

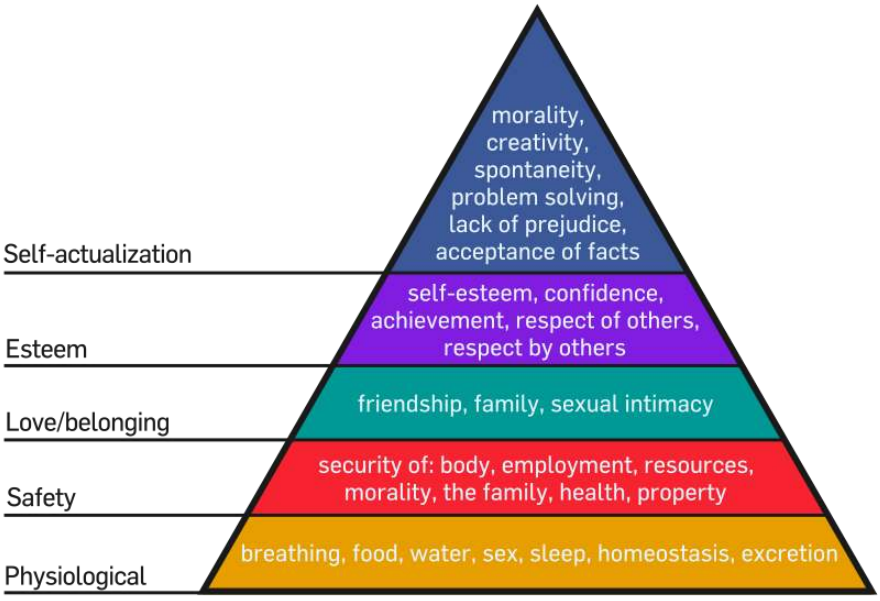


Figure 1.2.1.1: Maslow's Hierarchy of Needs

Physiological Needs

Physiological needs are generally obvious because they are required for survival. If requirements are not met, the body cannot continue to function. Air, water, food, clothing, and shelter are the basic physiological needs.

Safety Needs

Once physical needs are satisfied, individual safety takes precedence. Safety and Security needs include:

- Personal and family safety
- Financial security
- Health and well-being

Love/belonging Needs

After physiological and safety needs are fulfilled, the third layer of human needs are interpersonal. This involves feelings of belongingness. Humans need to feel a sense of belonging and acceptance, whether it comes from larger community affiliations or simply a few close friends. Without these connections, many people become susceptible to loneliness, social anxiety, and clinical depression. This need for belonging can sometimes overcome physiological and security needs. For example, an anorexic may ignore the need to eat and the security of health for a feeling of control and belonging. Deficiencies in interpersonal needs, due to neglect, shunning, ostracism, etc., can impact an individual's ability to form and maintain emotionally significant relationships.

Esteem

Esteem represents the normal human desire to be accepted and valued by others. People need to engage themselves to gain recognition and have an activity or activities that give the person a sense of contribution, to feel self-valued, be it in a profession or hobby. Imbalances at this level can result in low self-esteem or an inferiority complex. Many people with low self-esteem will not be able to improve their view of themselves simply by receiving fame, respect, and glory externally, but must first accept themselves internally. Psychological imbalances, such as depression, can prevent one from obtaining self-esteem on both levels.

Self-actualization

This level of need refers to what a person's full potential is and the realization of that potential. Maslow describes this level as the desire to accomplish everything that one can, to become the most that one can be. Individuals may perceive or focus on this need very specifically. For example, one individual may have the strong desire to become an ideal parent. In another, the desire may be expressed athletically. For others, it may be expressed in paintings, pictures, or inventions. Maslow believed that to acquire this level of need, the person must adequately achieve the previous needs.

Examples: The movie Cast Away

The movie, Cast Away, demonstrates Maslow's Hierarchy of Needs. When Tom Hanks character is marooned on a deserted island the first things he does find water and food. These actions satisfy his immediate physiological needs. Next he needs to find shelter for safety and security. To meet his love and belongingness needs he has "Wilson"

Positive Psychology: The Science of Happiness

Why study happiness? What does happiness have to do with well-being? For your well-being, is it more important to focus on being happy as a goal or focus on bringing positivity into your life? What do Denmark, Iceland, Switzerland, Finland, and Netherlands have in common?

Happiness has been linked to health with research indicating that being happy lowers disease risk, increases the likelihood of including positive behaviors in your life, and reduced the chance of all-cause mortality[2]. The science of happiness is just one area of what is called Positive Psychology[3]. Positive psychology is a relatively new field that shifted the discussion from a specific focus on what is wrong with someone (disease or illness) to what is right, by utilizing research to understand what contributes to a persons optimal functioning and helps them to flourish. This shift in focus is one factor that led to the publication of the World Happiness Report. Since 2012, the World Happiness Report has been published annually focusing on the state of global happiness for 156 countries by measuring how happy their citizens perceive themselves to be. Denmark, Iceland, Switzerland, Finland, and Netherlands are routinely shown to be the happiest countries in the world.

Studies show that focusing on positivity in your life is associated with overall happiness, life satisfaction, and psychological well-being, whereas a focus on seeking happiness or being happy is associated with negative feelings[4]. To increase happiness in your life, focus on bringing positivity into you life, which will lead to happiness. Just focusing on wanting to be happy will likely have a negative impact on your well-being.

Focus on your mental health

Ways to maintain positive mental health include:

- Getting professional help if you need it
- Connecting with others
- Staying positive
- Getting physically active
- Helping others
- Getting enough sleep
- Developing coping skills
- Developing a sense of meaning and purpose in life.
- Relaxation Techniques (meditation)
- Practice Mindfulness
- Practice Gratitude

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1.2.2: Mental Illness

We have all had some exposure to mental illness, but do we really understand it or know what it is? Many of our preconceptions are incorrect. A mental illness can be defined as a health condition that changes a person's thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning. As with many diseases, mental illness is severe in some cases and mild in others. Individuals who have a mental illness don't necessarily look like they are sick, especially if their illness is mild. Other individuals may show more explicit symptoms such as confusion, agitation, or withdrawal.

Even if you or a family member has not experienced mental illness directly, it is very likely that you have known someone who has. Estimates are that at least one in four people is affected by mental illness either directly or indirectly.

Consider the following statistics to get an idea of just how widespread the effects of mental illness are in society:

- According to recent estimates, approximately 20 percent of Americans, or about one in five people over the age of 18, suffer from a diagnosable mental disorder in a given year.
- Four of the 10 leading causes of disability—major depression, bipolar disorder, schizophrenia, and obsessive-compulsive disorder—are mental illnesses.
- About 3 percent of the population have more than one mental illness at a time.
- About 5 percent of adults are affected so seriously by mental illness that it interferes with their ability to function in society. These severe and persistent mental illnesses include schizophrenia, bipolar disorder, other severe forms of depression, panic disorder, and obsessive-compulsive disorder.
- Approximately 20 percent of doctors' appointments are related to anxiety disorders such as panic attacks. Eight million people have depression each year.
- Two million Americans have schizophrenia disorders, and 300,000 new cases are diagnosed each year.

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1.2.3: Challenges to our Mental Health

Although it is important to focus on reaching your full potential and embracing positivity, this does not mean you will not have challenges to your mental health. Many factors contribute to mental health problems, including:

- Biological factors, such as genes or brain chemistry
- Life experiences, such as trauma or abuse
- Family history of mental health problems
- Experiences related to other ongoing (chronic) medical conditions, such as cancer or diabetes
- Use of alcohol or drugs
- Having feelings of loneliness or isolation

Mental Health Statistics

Mental illness is very common. It is so common that more than 50% of Americans will be diagnosed with a mental illness or disorder at some point in their lifetime, with 1 in 5 Americans experiencing a mental illness in any given year. Mental illness does no just effect adults, 1 in 5 children, either currently or at some point during their life, have had a seriously debilitating mental illness. Mental illness varies in degree of severity from mild to severe with about 1 in 25 Americans living with a serious mental illness, such as schizophrenia, bipolar disorder, or major depression.

The National Institute of Mental Health categorizes mental illness into two broad categories, Any Mental Illness (AMI) and Serious Mental Illness (SMI).

- **Any mental illness (AMI)** is defined as a mental, behavioral, or emotional disorder. AMI can vary in impact, ranging from no impairment to mild, moderate, and even severe impairment (e.g., individuals with serious mental illness as defined below).
  - In 2021, there were an estimated 57.8 million adults aged 18 or older in the United States with AMI. This number represented 22.0% of all U.S. adults.
  - The prevalence of AMI was higher among females (25.8%) than males (15.8%).
  - Young adults aged 18-25 years had the highest prevalence of AMI (30.6%) compared to adults aged 26-49 years (25.3%) and aged 50 and older (14.5%).
  - The prevalence of AMI was highest among the adults reporting two or more races (35.8%), followed by White adults (22.6%). The prevalence of AMI was lowest among Asian adults (13.9%).
- **Serious mental illness (SMI)** is defined as a mental, behavioral, or emotional disorder resulting in serious functional impairment, which substantially interferes with or limits one or more major life activities. The burden of mental illnesses is particularly concentrated among those who experience disability due to SMI.
  - In 2020, there were an estimated 14.2 million adults aged 18 or older in the United States with SMI. This number represented 5.6% of all U.S. adults.
  - The prevalence of SMI was higher among females (7.0%) than males (4.2%).
  - Young adults aged 18-25 years had the highest prevalence of SMI (9.7%) compared to adults aged 26-49 years (6.9%) and aged 50 and older (3.4%).
  - The prevalence of SMI was highest among the adults reporting two or more races (9.9%), followed by American Indian / Alaskan Native (AI/AN) adults (6.6%). The prevalence of SMI was lowest among Native Hawaiian / Other Pacific Islander (NH/OPI) adults (1.2%).

Warning Signs of Mental Illness

Not sure if you or someone you know is living with mental health problems? Experiencing one or more of the following feelings or behaviors can be an early warning sign of a problem:

- Eating or sleeping too much or too little
- Pulling away from people and usual activities
- Having low or no energy
- Feeling numb or like nothing matters
- Having unexplained aches and pains
- Feeling helpless or hopeless
- Smoking, drinking, or using drugs more than usual

- Feeling unusually confused, forgetful, on edge, angry, upset, worried, or scared
- Yelling or fighting with family and friends
- Experiencing severe mood swings that cause problems in relationships
- Having persistent thoughts and memories you can't get out of your head
- Hearing voices or believing things that are not true
- Thinking of harming yourself or others
- Inability to perform daily tasks like taking care of your kids or getting to work or school

Coping Mechanisms and Defense Mechanisms

When confronted with something that is challenging to our mental health or stress, many people respond with coping mechanisms[5] or defense mechanisms[6]. The main difference between coping mechanisms and defense mechanisms is that coping is something you consciously do and a defense mechanism is often employed unconsciously. Both actions are intended to manage a situation that is creating a problem for the person.

When confronted with a challenge, people might consciously employ problem-focused, emotion-focused, meaning-focused, or social-focused coping mechanisms. Many of these coping mechanisms can be helpful, however people might employee maladaptive coping mechanisms which could lead to poor mental health such as using drugs or alcohol to avoid a problem.

Table 1.2.3.1: Coping Mechanisms

Coping Mechanism Category	Description	Example
Problem-focused	An individual focuses on solving the problem	Active coping, problem-solving, planning, restraint coping, and suppression of competing activities.
Emotion-focused	An individual aims to reduce the negative emotions associated with the problem	Positive reframing, acceptance, and humor
Meaning-focused	An individual uses cognitive strategies to derive and manage the meaning of the situation	Focus on beliefs and values to support well-being
Social-focused	An individual reduces stress by seeking emotional or instrumental support from their community	Reach out to people

Good coping skills include:

- Practicing meditation and relaxation techniques
- Having time to yourself
- Engaging in physical activity or exercise
- Reading
- Spending time with friends
- Finding humor
- Spending time on your hobbies
- Engaging in spirituality
- Spending quality time with your pets
- Getting a good night's sleep
- Eating healthy.

Negative coping skills include:

- Using drugs
- Drinking alcohol excessively
- Engaging in self-mutilation
- Ignoring or bottling up feelings
- Taking sedatives

- Taking stimulants
- Working too much
- Avoiding your problems
- Being in denial.

Of the negative coping skills listed above, two of them are considered defense mechanisms, avoidance and denial. Defense mechanisms are psychological mechanisms aimed at reducing anxiety. They were first discussed by Sigmund Freud as part of his psychoanalytic theory and further developed by his daughter, Anna Freud. Often unconscious, defense mechanisms are used to protect an individual from psychological pain or anxiety.

Defense mechanisms include avoidance, repressions, regression, dispalcement, sublimation, reaction formation, projections, and rationalization as shown in the following Table.

Table 1.2.3.1: Defense Mechanisms

Defense Mechanism	Description	Example
Avoidance	Any behavior used to escape, distract, or avoid difficult thoughts, feelings, or situations.	Utilizing drugs or alcohol to numb feelings or making up excused to avoid attending social gatherings.
Repression	Unknowingly placing an unpleasant memory or thought in the conscious	Not remembering a traumatic event such as being sexually abused as a child.
Regression	Reverting back to an immature behavior from an earlier stage of development	Throwing temper tantrums as an adult when you don't get your way
Displacement	Redirecting feelings or actions from the intended source to a safer, substitute target	Taking your anger towards your boss out on family members by yelling at them in place of your boss.
Sublimation	Replacing socially unacceptable impulses with socially acceptable behavior	Channeling aggressiveness into playing football
Reaction formation	Overacting in the opposite way to one's true feelings.	Being overly protective of an unwanted child.
Projection	Attributing one's own unacceptable feelings and thoughts to others and not yourself	Accusing your boy/girlfriend of cheating on you because you have thoughts about cheating on him/her
Rationalization	Justifying actions, thoughts, or unwanted outcomes with excuses or faulty logic	Blaming the teaching style of a professor for why you failed an exam.

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1.2.4: Mental Health Disorders

Mental illness or disorders are often categorized into Mood Disorders, Anxiety Disorders, Psychotic Disorders, and Eating Disorders.

Mood disorders, also called affective disorders, affect your emotional state focusing on how you feel from extreme sadness to extreme happiness. Anxiety disorders occur when a person responds to something with fear or dread and has a severe stress response that may include physical reactions such as rapid heart rate, overwhelming worry, muscle tension, trouble sleeping, nausea, and diarrhea. Psychotic Disorders, also called thought disorders, involve distorted awareness or thinking.

Mood Disorders include:

- Depression
- Bipolar disorders
- Seasonal affective disorder

Anxiety Disorders include:

- General anxiety
- Specific phobias and Agoraphobia
- Post-traumatic stress disorder
- Panic disorder
- Social anxiety disorder

Psychotic Disorders include:

- Schizophrenia

Eating Disorders include

- Anorexia Nervosa
- Bulimia Nervosa
- Binge Eating

Depression

Depression (major depressive disorder or clinical depression) is the most common mood disorder characterized by severe symptoms that affect how you feel, think, and handle daily activities, such as sleeping, eating, or working. Depression is more than just feeling down or having a bad day. When a sad mood lasts for a long time and interferes with normal, everyday functioning, you may be clinically depressed.

It is estimated that about 1 out of every 6 adults will have depression at some time in their life. There are varying levels of depression and causes of depression. A person with persistent depressive disorder (also called dysthymia) means they have suffered from depressed mood that lasts for at least two years. A woman with perinatal depression has experienced full-blown major depression during pregnancy or after delivery (postpartum depression).

Symptoms of depression include:

- Feeling sad or anxious often or all the time
- Not wanting to do activities that used to be fun
- Feeling irritable, easily frustrated, or restless
- Having trouble falling asleep or staying asleep
- Waking up too early or sleeping too much
- Eating more or less than usual or having no appetite
- Experiencing aches, pains, headaches, or stomach problems that do not improve with treatment
- Having trouble concentrating, remembering details, or making decisions
- Feeling tired, even after sleeping well
- Feeling guilty, worthless, or helpless
- Thinking about suicide or hurting yourself

Not everyone who is depressed experiences every symptom. Some people experience only a few symptoms while others may experience many. Several persistent symptoms in addition to low mood are required for a diagnosis of major depression, but people with only a few – but distressing – symptoms may benefit from treatment of their "subsyndromal" depression. The severity and frequency of symptoms and how long they last will vary depending on the individual and his or her particular illness. Symptoms may also vary depending on the stage of the illness.

📌 The national rise in anxiety and depression began around 2011. The generation born between 1995 and 2112 are growing up more slowly, have spent less time unsupervised, and have hit fewer developmental milestones on the path to autonomy (e.g., getting a job or a driver's license), compared with 18-year-olds in previous generations (Twenge, 2018). They have far higher rates of anxiety and depression. The increases for females are generally much larger than for males, as evidenced by rising hospital admission rates of self-harm and in rising suicide rates. The suicide rate of adolescent girls has doubled since 2007. The primary cause of the increase in mental illness is frequent use of smartphones and other electronic devices. **Less than two hours a day seems to have no deleterious effects, but adolescents who spend several hours a day interacting with screens, particularly if they start in their early teen years or younger, have worse mental health outcomes than do adolescents who use these devices less and who spend more time in face-to-face interaction (Lukianoff & Haidt, 2018).**

Girls may be suffering more than boys because they are more adversely affected by social comparisons (especially based on digitally enhanced beauty), by signals that they are being left out, and by relational aggression, all of which became easier to enact and harder to escape when adolescents have smartphones and social media (Lukianoff & Haidt, 2018).

Bipolar Disorder

Bipolar disorder is a mood disorder characterized by intense mood swings. Sometimes you may feel extremely "up," elated, irritable, or energized. This is called a manic episode. Other times you may feel "down," sad, indifferent, or hopeless. This is called a depressive episode. You may have both manic and depressive symptoms together. This is called a mixed episode.

Symptoms of Bipolar include:

- The symptoms of a manic episode can include
  - Feeling very up, high, or elated
  - Feeling jumpy or wired, more active than usual
  - Having a very short temper or seeming extremely irritable
  - Having racing thoughts and talking very fast
  - Needing less sleep
  - Feeling like you are unusually important, talented, or powerful
  - Do risky things that show poor judgment, such as eating and drinking too much, spending or giving away a lot of money, or having reckless sex
- The symptoms of a depressive episode can include
  - Feeling very sad, hopeless, or worthless
  - Feeling lonely or isolating yourself from others
  - Talking very slowly, feeling like you have nothing to say, or forgetting a lot
  - Having little energySleeping too much
  - Eating too much or too little
  - Lack of interest in your usual activities and being unable to do even simple things
  - Thinking about death or suicide
- The symptoms of a mixed episode include both manic and depressive symptoms together. For example, you may feel very sad, empty, or hopeless, while at the same time feeling extremely energized.

Seasonal Affective Disorder (SAD)

SAD is a specific type of Depression (a mood disorder) that comes and goes with the seasons.

Seasonal affective disorder is characterized by the onset of depression during the winter months, when there is less natural sunlight. This depression generally lifts during spring and summer. Winter depression, typically accompanied by social withdrawal, increased sleep, and weight gain, predictably returns every year in seasonal affective disorder.

Symptoms of SAD include:

- Sadness
- Gloomy outlook
- Feeling hopeless, worthless, and irritable
- Loss of interest or pleasure in activities you used to enjoy
- Low energy
- Difficulty sleeping or oversleeping
- Carbohydrate cravings and weight gain
- Thoughts of death or suicide

General Anxiety

Generalized Anxiety Disorder is an anxiety disorder characterized by excessive worrying. People with GAD excessively worry about ordinary daily issues such as health, money, work, and family on most days for at least 6 months.

Symptoms of GAD include:

- Feeling restless, wound-up, or on-edge
- Being easily fatigued
- Having difficulty concentrating; mind going blank
- Being irritable
- Having muscle tension
- Difficulty controlling feelings of worry
- Having sleep problems, such as difficulty falling or staying asleep, restlessness, or unsatisfying sleep

Panic Disorder

Panic disorder is an anxiety disorder characterized by recurrent unexpected panic attacks, which are sudden periods of intense fear that may include palpitations, pounding heart, or accelerated heart rate; sweating; trembling or shaking; sensations of shortness of breath, smothering, or choking; and feeling of impending doom.

Symptoms of panic disorder include:

- Heart palpitations, a pounding heartbeat, or an accelerated heartrate
- Sweating
- Trembling or shaking
- Sensations of shortness of breath, smothering, or choking
- Feelings of impending doom
- Feelings of being out of control

People with panic disorder often worry about when the next attack will happen and actively try to prevent future attacks by avoiding places, situations, or behaviors they associate with panic attacks. Worry about panic attacks, and the effort spent trying to avoid attacks, cause significant problems in various areas of the person's life, including the development of agoraphobia.

Specific Phobias and Agoraphobia

A phobia is an anxiety disorder characterized by a strong, irrational fear of something that poses little or no real danger. There are many specific phobias such as the fear of heights which is called Acrophobia, or the fear of spiders termed Arachnophobia. A person who has a fear of public spaces is termed Agoraphobia. If you become anxious and extremely self-conscious in everyday social situations, you could have a social phobia, also referred to as a social anxiety disorder.

Symptoms of specific phobias include:

- May have an irrational or excessive worry about encountering the feared object or situation
- Take active steps to avoid the feared object or situation
- Experience immediate intense anxiety upon encountering the feared object or situation
- Endure unavoidable objects and situations with intense anxiety

Agoraphobia: People with agoraphobia have an intense fear of two or more of the following situations:

- Using public transportation
- Being in open spaces

- Being in enclosed spaces
- Standing in line or being in a crowd
- Being outside of the home alone

People with agoraphobia often avoid these situations, in part, because they think being able to leave might be difficult or impossible in the event they have panic-like reactions or other embarrassing symptoms. In the most severe form of agoraphobia, an individual can become housebound.

Social Anxiety Disorder (social phobia)

Social anxiety disorder is an anxiety disorder characterized by a general intense fear of, or anxiety toward, social or performance situations. They worry that actions or behaviors associated with their anxiety will be negatively evaluated by others, leading them to feel embarrassed.

Symptoms of Social Anxiety Disorder include:

- Feeling highly anxious about being with other people and having a hard time talking to them
- Feeling very self-conscious in front of other people and worried about feeling humiliated, embarrassed, or rejected, or fearful of offending others
- Being very afraid that other people will judge them
- Worrying for days or weeks before an event where other people will be
- Staying away from places where there are other people
- Having a hard time making friends and keeping friends
- Blushing, sweating, or trembling around other people
- Feeling nauseous or sick to your stomach when other people are around

Post-traumatic stress disorder

PTSD is an anxiety disorder that develops in some people who have experienced a shocking, scary, or dangerous event. The “fight of flight” reaction is a natural process meant to keep a person from harm when in traumatic experiences, however for those with PTSD the reaction continues for a long period of time or they experience the reaction even when they are not in danger.

Symptoms include:

- To be diagnosed with PTSD, an adult must have all of the following for at least 1 month:
  - At least one re-experiencing symptom
  - At least one avoidance symptom
  - At least two arousal and reactivity symptoms
  - At least two cognition and mood symptoms
- Re-experiencing symptoms include:
  - Flashbacks—reliving the trauma over and over, including physical symptoms like a racing heart or sweating
  - Bad dreams
  - Frightening thoughts

Schizophrenia

Schizophrenia is a psychotic disorder that affects how a person thinks, feels, and behaves. People with schizophrenia may seem like they have lost touch with reality, which causes significant distress for the individual, their family members, and friends. Schizophrenia is typically diagnosed in the late teen years to the early thirties and tends to emerge earlier in males (late adolescence – early twenties) than females (early twenties – early thirties).

Symptoms of Schizophrenia include:

- Psychotic Symptoms
  - Hallucinations, such as hearing voices or seeing things that aren’t there
  - Delusions, which are firmly held beliefs not supported by objective facts (e.g., paranoia – irrational fears that others are “out to get you” or believing that the television, radio, or internet are broadcasting special messages that require some response)
- Negative Symptoms
  - Reduced motivation and difficulty planning, beginning, and sustaining activities

- Diminished feelings of pleasure in everyday life
- "Flat affect," or reduced expression of emotions via facial expression or voice tone
- Reduced speaking

- Cognitive Symptoms
  - Difficulty processing information to make decisions
  - Problems using information immediately after learning it
  - Trouble focusing or paying attention

Eating Disorders and Mental Health

Eating disorders are not a choice, rather they are serious and often fatal illnesses that are associated with severe disturbances in people's eating behaviors and related thoughts and emotions. Researchers are finding that eating disorders are caused by a complex interaction of genetic, biological, behavioral, psychological, and social factors.

Review chapter 4 for more in-depth explanations of common eating disorders.

Suicide

Suicide is a major public health concern. In 2020, an estimated 12.2 million American adults seriously thought about suicide, 3.2 million planned a suicide attempt, 1.2 million attempted suicide, and 45,979 died by suicide. In 2020, suicide was among the top 9 leading causes of death for people ages 10-64 and the second leading cause of death for people ages 10-14 and 25-34. Depression, substance use disorders, and psychosis are the most relevant risk factors for suicide, with anxiety, personality, eating, and trauma-related disorders also contributing to risk of suicide. Most people, could be at least 90%, who have died by suicide have suffered from mental disorders[7]. Suicide is complicated and tragic but it is often preventable. Knowing the warning signs for suicide and how to get help can help save lives.

Harvard University and UC Berkeley found that 9 out of 10 people who attempt suicide and survive will not go on to die by suicide at a later date.

"One of the things that I've learned in this whole fight from the very beginning when I got into it was the power of the access restriction method," Muller says. "You don't have to have a degree in psychology to restrict access to lethal means. You may need nothing more than, for instance, gun locks. Reducing that access means you buy the suicidal individual more time and that gives them time for counseling treatment. It gives [professionals] an opportunity to pull them off the edge."

Suicidal thoughts or actions are a sign of extreme distress and should not be ignored.

Warning signs that someone may be at immediate risk for attempting suicide include:

- Talking about wanting to die or wanting to kill themselves
- Talking about feeling empty or hopeless or having no reason to live
- Talking about feeling trapped or feeling that there are no solutions
- Feeling unbearable emotional or physical pain
- Talking about being a burden to others
- Withdrawing from family and friends
- Giving away important possessions
- Saying goodbye to friends and family
- Putting affairs in order, such as making a will
- Taking great risks that could lead to death, such as driving extremely fast
- Talking or thinking about death often

Other serious warning signs that someone may be at risk for attempting suicide include:

- Displaying extreme mood swings, suddenly changing from very sad to very calm or happy
- Making a plan or looking for ways to kill themselves, such as searching for lethal methods online, stockpiling pills, or buying a gun
- Talking about feeling great guilt or shame
- Using alcohol or drugs more often
- Acting anxious or agitated
- Changing eating or sleeping habits

- Showing rage or talking about seeking revenge

Risk Factors for suicide

- Depression, other mental disorders, or substance use disorder
- Chronic pain
- A history of suicide attempts
- Family history of a mental disorder or substance use
- Family history of suicide
- Exposure to family violence, including physical or sexual abuse
- Presence of guns or other firearms in the home
- Having recently been released from prison or jail
- Exposure, either directly or indirectly, to others' suicidal behavior, such as that of family members, peers, or celebrities

How can you help? 5 Action Steps for Helping Someone in Emotional Pain

1. **Ask:** "Are you thinking about killing yourself?" It's not an easy question but studies show that asking at-risk individuals if they are suicidal does not increase suicides or suicidal thoughts.
2. **Keep them safe:** Reducing a suicidal person's access to highly lethal items or places is an important part of suicide prevention. While this is not always easy, asking if the at-risk person has a plan and removing or disabling the lethal means can make a difference.
3. **Be there:** Listen carefully and learn what the individual is thinking and feeling. Findings suggest acknowledging and talking about suicide may in fact reduce rather than increase suicidal thoughts.
4. **Help them connect with help**
   - Call the toll-free National Suicide Prevention Lifeline at 988, 24 hours a day, 7 days a week. The service is available to everyone.
   - You can also connect 24/7 to a crisis counselor by texting the Crisis Text Line.Text HOME to 741741.
   - The deaf and hard of hearing can contact the Lifeline via TTY at 1-800-799-4889.
   - You can also help make a connection with a trusted individual like a family member, friend, spiritual advisor, or mental health professional.
5. **Stay Connected:** Staying in touch after a crisis or after being discharged from care can make a difference. Studies have shown the number of suicide deaths goes down when someone follows up with the at-risk person.

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1.2.5: Developing and Protecting Individual Attributes

At its core, mental health and well-being rests on the capacity of individuals to manage their thoughts, feelings and behavior, as well as their interactions with others. It is essential that these core attributes of self-control, resilience and confidence be allowed to develop and solidify in the formative stages of life, so that individuals are equipped to deal with the complex choices and potential adversities they will face as they grow older.

Alcohol, tobacco and drug use pose risks to mental and physical health, particularly among pregnant women and adolescents. Raising awareness about the health risks of substance use can be accompanied by implementation of a number of proven strategies for reducing their use, including fiscal measures (namely, increased excise taxes) and regulatory instruments (such as comprehensive restrictions on advertising, minimum age of use and restrictions on smoking in public places).

Maintaining a healthy diet and regular physical exercise are also protective factors for mental health and can be considered as part of a holistic approach to health promotion and protection in the population. Getting enough sleep also makes a big difference. Taking care of your mental health means managing your time, commitments, and stress levels. Sometimes this may feel overwhelming, but you can do it! If you need help, please set up a free, confidential counseling appointment with our college's mental health & wellness professionals.

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1.2.6: 2.11 Factors That Influence Psychological Well-Being

Infancy and Early Childhood

There is a strong body of evidence to show the importance of attachment by neonates to their mothers or other primary caregivers for subsequent social and emotional development. Separation from the primary caregiver - due for example to parental absence or rejection - leads to anxiety, stress and insecurity. Post-natal depression among new mothers can likewise contribute to sub-optimal attachment and development. Parents who have difficulties in bonding, have limited skills or exhibit negative attitudes place their children at increased risk of exposure to stress and behavioral problems. Other important risks to physical and cognitive development in infancy and early childhood include maltreatment and neglect (by parents and other caregivers), malnutrition and infectious or parasitic diseases.

Individual attributes and behaviors

These relate to a person's innate and learned ability to deal with thoughts and feelings and to manage him/herself in daily life ('emotional intelligence'). It is also the capacity to deal with the social world around by partaking in social activities, taking responsibilities or respecting the views of others ('social intelligence'). An individual's mental health state can also be influenced by genetic and biological factors; that is, determinants that persons are born or endowed with, including chromosomal abnormalities (e.g. Down's syndrome) and intellectual disability caused by prenatal exposure to alcohol or oxygen deprivation at birth.

Social and economic circumstances

The capacity for people to develop and flourish is deeply influenced by their immediate social surroundings – including their opportunity to engage positively with family members, friends or colleagues, and earn a living for themselves and their families – and also by the socioeconomic circumstances in which they find themselves. Restricted or lost opportunities to gain an education and income are especially pertinent socio-economic factors.

Environmental factors

The wider sociocultural and geopolitical environment in which people live can also affect an individual's, household's or community's mental health status, including levels of access to basic commodities and services (water, essential health services, the rule of law), exposure to predominating cultural beliefs, attitudes or practices, as well as by social and economic policies formed at the national level; for example, the on-going global financial crisis is expected to have significant mental health consequences, including increased rates of suicide and harmful alcohol use. Discrimination, social or gender inequality and conflict are examples of adverse structural determinants of mental well-being.

Personality

Personality measures turn out to be good predictors of your health, your sexual promiscuity, your likelihood of divorce, how happy you typically are—even your taste in paintings. Personality is a much better predictor of these things than social class or age. The origin of these differences is in part innate. That is to say, when people are adopted at birth and brought up by new families, their personalities are more similar to their blood relatives than to the ones they grew up with. The differences begin to emerge early in life and are surprisingly stable across the decades. This is not to say that people cannot change, but major change is the exception rather than the rule. Personality differences tend to manifest themselves through the quick, gut-feeling, intuitive, and emotional systems of thehuman mind. The slower, rational, deliberate systems show less variation in output from person to person. Deliberate rational strategies can be used to over-ride intuitive patterns of response, and this is how people wishing to change their personalities or feelings have to go about it.

So what are the major ways personalities can differ? The dominant approach is to think of the space of possible personalities as being defined by a number of dimensions. Each person can be given a location in the space by their scores on all the different dimensions. Virtually all theories agree on two of the main dimensions, though they differ on how many additional ones they recognize.

Five factors

- Openness to experience: (inventive/curious vs. consistent/cautious). Appreciation for art, emotion, adventure, unusual ideas, curiosity, and variety of experience. Openness reflects the degree of intellectual curiosity, creativity and a preference for novelty

and variety a person has. It is also described as the extent to which a person is imaginative or independent and depicts a personal preference for a variety of activities over a strict routine. High openness can be perceived as unpredictability or lack of focus. Moreover, individuals with high openness are said to pursue selfactualization specifically by seeking out in tense, euphoric experiences. Conversely, those with low openness seek to gain fulfillment through perseverance and are characterized as pragmatic and data-driven—sometimes even perceived to be dogmatic and closed-minded. Some disagreement remains about how to interpret and contextualize the openness factor.

- Conscientiousness: (efficient/organized vs. easy-going/careless). A tendency to be organized and dependable, show self-discipline, act dutifully, aim for achievement, and prefer planned rather than spontaneous behavior. High conscientiousness is often perceived as stubbornness and obsession. Low conscientiousness is associated with flexibility and spontaneity, but can also appear as sloppiness and lack of reliability.
- Extraversion: (outgoing/energetic vs. solitary/reserved). Energy, positive emotions, surgency, assertiveness, sociability and the tendency to seek stimulation in the company of others, and talkativeness. High extraversion is often perceived as attention-seeking, and domineering. Low extraversion causes a reserved, reflective personality, which can be perceived as aloof or self-absorbed.
- Agreeableness: (friendly/compassionate vs. challenging/detached). A tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others. It is also a measure of one's trusting and helpful nature, and whether a person is generally well-tempered or not. High agreeableness is often seen as naive or submissive. Low agreeableness personalities are often competitive or challenging people, which can be seen as argumentativeness or untrustworthiness.
- Neuroticism: (sensitive/nervous vs. secure/confident). The tendency to experience unpleasant emotions easily, such as anger, anxiety, depression, and vulnerability. Neuroticism also refers to the degree of emotional stability and impulse control and is sometimes referred to by its low pole, "emotional stability". A high need for stability manifests itself as a stable and calm personality, but can be seen as uninspiring and unconcerned. A low need for stability causes a reactive and excitable personality, often very dynamic individuals, but they can be perceived as unstable or insecure.

Assess yourself! This is an interactive version of the IPIP Big-Five Factor Markers, a measure of the big five personality traits: Big 5 Personality Test

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1.2.7: Mental Health - Risks, Causes, and Treatments

Mental illnesses, in general, are thought to be caused by a variety of genetic and environmental factors, these include:

- **Inherited traits.** Mental illness is more common in people whose blood relatives also have a mental illness. Certain genes may increase your risk of developing a mental illness, and your life situation may trigger it.
- **Environmental exposures before birth.** Exposure to environmental stressors, inflammatory conditions, toxins, alcohol or drugs while in the womb can sometimes be linked to mental illness.
- **Brain chemistry.** Neurotransmitters are naturally occurring brain chemicals that carry signals to other parts of your brain and body. When the neural networks involving these chemicals are impaired, the function of nerve receptors and nerve systems change, leading to depression and other emotional disorders.

Certain factors may increase your risk of developing a mental illness, including:

- A history of mental illness in a blood relative, such as a parent or sibling
- Stressful life situations, such as financial problems, a loved one's death or a divorce
- An ongoing (chronic) medical condition, such as diabetes
- Brain damage as a result of a serious injury (traumatic brain injury), such as a violent blow to the head
- Traumatic experiences, such as military combat or assault
- Use of alcohol or recreational drugs
- A childhood history of abuse or neglect
- Few friends or few healthy relationships
- A previous mental illness

Treatment begins with getting a medical diagnosis to understand which mental illness may be causing your symptoms. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5), published by the American Psychiatric Association, is used for diagnosis. Treatment depends on the type of mental disorder and may include medications, physicians, psychotherapist, psychiatrists, and social workers or family members.

- Psychotherapy
  - Psychotherapy or "talk therapy" can help people with anxiety disorders. To be effective, psychotherapy must be directed at the person's specific anxieties and tailored to his or her needs. A typical "side effect" of psychotherapy is temporary discomfort involved with thinking about confronting feared situations.
- Cognitive Behavioral Therapy (CBT)
  - CBT is a type of psychotherapy that can help people with anxiety disorders. It teaches a person different ways of thinking, behaving, and reacting to anxiety-producing and fearful situations. CBT can also help people learn and practice social skills, which is vital for treating social anxiety disorder.
  - Two specific stand-alone components of CBT used to treat social anxiety disorder are cognitive therapy and exposure therapy. Cognitive therapy focuses on identifying, challenging, and then neutralizing unhelpful thoughts underlying anxiety disorders. Exposure therapy focuses on confronting the fears underlying an anxiety disorder in order to help people engage in activities they have been avoiding.
- Stress-Management Techniques
  - Stress management techniques and meditation can help people with anxiety disorders calm themselves and may enhance the effects of therapy. While there is evidence that aerobic exercise has a calming effect, the quality of the studies is not strong enough to support its use as treatment. Since caffeine, certain illicit drugs, and even some over-the-counter cold medications can aggravate the symptoms of anxiety disorders, avoiding them should be considered. Check with your physician or pharmacist before taking any additional medications.
  - The family can be important in the recovery of a person with an anxiety disorder. Ideally, the family should be supportive but not help perpetuate their loved one's symptoms. Talking with a trusted friend or member of the clergy can also provide support, but it is not necessarily a sufficient alternative to care from an expert clinician.
- Medication
  - Medication does not cure anxiety disorders but often relieves symptoms. Medication can only be prescribed by a medical doctor (such as a psychiatrist or a primary care provider), but a few states allow psychologists to prescribe psychiatric medications.

- Medications are sometimes used as the initial treatment of an anxiety disorder, or are used only if there is insufficient response to a course of psychotherapy. In research studies, it is common for patients treated with a combination of psychotherapy and medication to have better outcomes than those treated with only one or the other.
- The most common classes of medications used to combat anxiety disorders are antidepressants, anti-anxiety drugs, and beta-blockers. Be aware that some medications are effective only if they are taken regularly and that symptoms may recur if the medication is stopped.

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1.2.8: End-of-Chapter Material

Key Takeaways for this Chapter

- Mental health is just as important as physical health.
- Meeting our physiological needs is a necessary foundation to reaching our human potential.
- Focusing on happiness and positivity increases our overall health and wellness.
- Mental illness is very common.
- Understanding warning signs of mental illness can help yourself and others.
- Help is available. Our campus health center offers free and confidential counseling.

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1.2.9: Emotional and Mental Health- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

A new way to help young people with their mental health



Break the silence for suicide attempt survivors



Debunking the myths of OCD



How do antidepressants work?



How gratitude rewires your brain



How to discover your “why” in difficult times



How to protect your mental well-being online — from a Gen-Zer



The gift and power of emotional courage



The Housing First approach to homelessness



The psychology of post-traumatic stress disorder



The voices in my head



What causes panic attacks, and how can you prevent them?



What is bipolar disorder?



What makes a good life? Lessons from the longest study on happiness



What’s normal anxiety — and what’s an anxiety disorder?



What’s your happiness score?



Why we get mad — and why it's healthy



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SECTION OVERVIEW

1.3: Identifying and Controlling Stress

Learning Outcomes

By the end of this chapter you will be able to:

- Define Stress
- Assess your level of stress
- Describe the physiological reaction of the “fight or flight” response
- Recognize the effects of stress on well being
- Describe productive and counterproductive cognitive and behavioral stress responses
- Apply stress reducing strategies

Have you ever said to someone “I am so stressed out”?

If so, what were you stressed about?

How did you feel when you were stressed?

What did you do when you were feeling stressed?

1.3.1: What is Stress?

1.3.2: Stress and Disease

1.3.3: Eustress

1.3.4: Stress is in the Eye of the Beholder

1.3.5: Managing Stress

1.3.6: Exercise and Stress

1.3.7: Meditation and Health

1.3.8: Relaxation Techniques

1.3.9: The Importance of Sleep

1.3.10: More Strategies for Coping with Stress

1.3.11: Resilience

1.3.12: End-of-Chapter Material

1.3.12.1: Stress- Optional Continued Learning

1.3.13: Stress- Optional Continued Learning

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1.3.1: What is Stress?

Stress — just the word may be enough to set your nerves on edge. Everyone feels stressed from time to time. But, what does it mean when we say we have stress? And is all stress bad?

Stress is how the body reacts to a challenge or demand.

Stressor is something that causes stress. These could include natural disasters, big life changes, poverty or inequality, demanding jobs, relationships, or daily hassles like traffic.

Stress Response is how you respond to stress including physical, emotional, and behavioral responses. The bodies physical response to stress is termed the "Fight or Flight" reaction. Emotional responses might include feelings of anger, sadness, inability to focus, irritable, or anxiousness. Behavioral responses to stress might include sleep disturbances, aggression, avoiding the challenge, or use of drugs or alcohol.

A simple way to differentiate these terms is the following equation:

Stressor + Stress Response = Stress

Reflection: Your Stressors and Responses

Take a few minutes to think about times in your life where you were stressed.

Make a list of your stressors: What caused the stress? What challenge, demand, or situation triggered the stress?

Make a list of your common stress responses: How did you respond to the stress? Did you recognize physical changes in your body? Did you recognize emotional changes? Did you respond with positive or negative behaviors?Looking back on the times of stress, can you identify any opportunities you might have to change your responses that might have lowered the stress in your life?

Common Stressors

Stress may be recurring, short-term, or long-term and may include things like commuting to and from school or work every day, traveling for a yearly vacation, or moving to another home.

Common causes of short-term stress:

- Needing to do a lot in a short amount of time
- Having a lot of small problems in the same day, like getting stuck in traffic jam or running late
- Getting ready for a work or school presentation
- Having an argument

Common causes of long-term stress:

- Having problems at work or at home
- Having money problems
- Having a long-term illness
- Taking care of someone with an illness
- Dealing with the death of a loved one

Change is a leading cause of stress. Changes can be positive or negative, as well as real or perceived. Changes can be mild and relatively harmless, such as winning a race, watching a scary movie, or riding a rollercoaster. Some changes are major, such as marriage or divorce, serious illness, or a car accident. Other changes are extreme, such as exposure to violence, and can lead to traumatic stress reactions.

Physical Response: The Fight or Flight Response

Imagine how you would feel in the following situations:

- You are driving to school and you see an accident occur right in front of you! You swerve and avoid crashing into the cars.
- You just got a call from the police that something has happened to your family member.
- You are on a morning walk and an aggressive dog comes running toward you.

You might feel the following physical symptoms:

- Rapid heartbeat
- Sweaty palms
- Tense muscles or shaking
- Rapid breathing
- Nauseous

The symptoms you feel are a product of the bodies automatic physical reaction to stressors, called the Fight or Flight response. The Fight or Flight response is very important for our survival as it enables the body to take action quickly, and is intended to keep us out of (physical) harm's way.

When a person senses that a situation demands action, the body responds by releasing chemicals into the blood. The hypothalamus signals the adrenal glands to release a surge of hormones that include adrenaline and cortisol. These stress hormones prepare the body to either fight off the stressor or flee from the stressor. Your heart rate increases to get more oxygenated blood to your muscles so you can prepare for action. Your breathing increases to get more oxygen. An increase in perspiration (sweating) keeps your body cool. These physiological effects are valuable when faced with a potentially dangerous situation.

Regardless of whether the stress experienced is negative or positive, small or extreme, the physical effects on the body are the same. For example, the stress hormones are produced whether you are stressed because of ongoing financial struggles or are stressed because you almost got in a bad car accident. Unfortunately, most of the stressors people face—work, school, finances, relationships—are a part of everyday life, and thus, inescapable. In modern life, we do not get the option of "flight" very often. We have to deal with those stressors all the time and find a solution. When you need to take an SAT test, there is no way for you to avoid it; sitting in the test room for five hours is the only choice. Lacking the "flight" option in stress-response process leads to higher stress levels in modern society. Living with constant stress that is constantly triggering a physical stress response can cause physical issues such as upset stomach, headaches, sleep problems, weight gain or loss, muscle aches, and heart disease.

Emotional and Behavioral Response

People respond to stress differently. For example, some people experience mainly digestive symptoms, while others may have headaches, sleeplessness, depressed mood, anger and irritability. Your emotional and behavioral responses to stressors in your life might include:

Psychological, emotional, or cognitive symptoms:

- Feeling heroic, euphoric or invulnerable
- Denial
- Anxiety or fear
- Worry about safety of self or others
- Irritability or anger
- Restlessness
- Sadness, moodiness, grief or depression
- Vivid or distressing dreams
- Guilt or "survivor guilt"
- Feeling overwhelmed, helpless or hopeless
- Feeling isolated, lost, lonely or abandoned
- Apathy
- Over identification with survivors
- Feeling misunderstood or unappreciated
- Memory problems/forgetfulness
- Disorientation
- Confusion
- Slowness in thinking, analyzing, or comprehending
- Difficulty calculating, setting priorities or making decisions
- Difficulty Concentrating
- Limited attention span
- Loss of objectivity
- Inability to stop thinking about the disaster or an incident

Behavioral or social symptoms:

- Change in activity levels
- Decreased efficiency and effectiveness
- Difficulty communicating
- Increased sense of humor/gallows humor
- Irritability, outbursts of anger, frequent arguments
- Inability to rest, relax, or let down
- Change in eating habits
- Change in sleep patterns
- Change in job performance
- Periods of crying
- Increased use of tobacco, alcohol, drugs, sugar or caffeine
- Hyper-vigilance about safety or the surrounding environment
- Avoidance of activities or places that trigger memories
- Accident prone
- Withdrawing or isolating from people
- Difficulty listening
- Difficulty sharing ideas
- Difficulty engaging in mutual problem solving
- Blaming
- Criticizing
- Intolerance of group process
- Difficulty in giving or accepting support or help
- Impatient with or disrespectful to others

Self-Assessment: Your Stress

After reading about common stressors and the stress responses, you might be interested in learning more about the stress in your life. A tool you can use to better understand your stress and your health is to take a Stress Self-Assessment. The following self-assessments are not used as a diagnosing tool, rather as a tool to help you become more self aware of stress you have so that you can make healthy lifestyle changes or seek medical assistance.

There are several Stress Self-Assessments available online, here are just a few:

- The Holmes-Rahe Stress Inventory
- The Workplace Stress Scale
- Test Your Stress (Based on the Perceived Stress Scale)
- What Are Your Stress Triggers?

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1.3.2: Stress and Disease

The relationship between stress and health is complex. Each person perceives and responds to stress differently and there are different types of stresses, both good and bad. For some people, it happens before having to speak in public. For other people, it might be before a first date. What causes stress for you may not be stressful for someone else. With so much variation in stress, it is challenging to determine the exact relationship of stress and disease. However, since about the 1940's scientists and researchers have been working to better understand the relationship.

People experience both eustress and distress. A person experiences eustress, also referred to as "good stress," when the stressor helps the body enhance performance or overcome lethargy, it is their optimal level of stress. Distress, or what we view as "bad stress," is when the body cannot cope with the stressor and leads to fatigue, or behavioral and physical problems. Stress can be helpful if it encourages you to meet a deadline or get things done. But feeling stressed for an extended amount of time can take a toll on your mental and physical health.

Optimal Stress

Although we tend to associate stress and health negatively, there is also a positive association between stress and health. Some stress can be good for you and help you to reach optimal performance. The relationship between stress and optimal performance is called the **Yerkes–Dodson law**, developed in 1908. Although this is called a law, it is actually a concept explaining that we need a certain amount of stress (arousal) to reach optimal (strong) performance. If we have too little stress or too much stress our performance will weaken. If we are under-aroused, we become bored and will seek out some sort of stimulation. On the other hand, if we are over-aroused, we will engage in behaviors to reduce our arousal/stress.

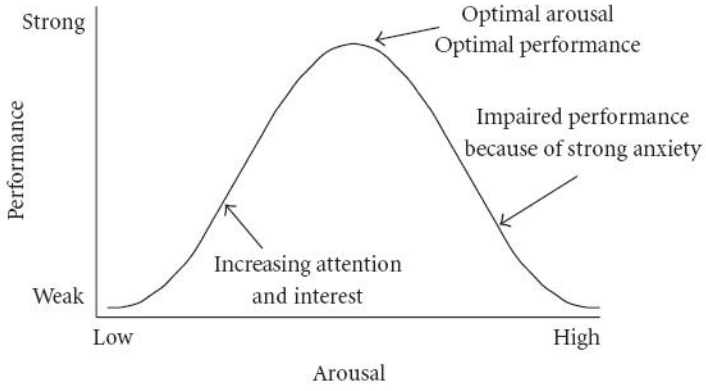


Figure 1.3.2.1: Yerkes-Dodson Theory of Optimal Arousal

Most students have experienced this need to maintain optimal levels of arousal (stress) over the course of their academic career. Think about how much stress students experience toward the end of spring semester—they feel overwhelmed with work and yearn for the rest and relaxation of summer break. Their arousal/stress level may be too high. Once they finish the semester, however, it doesn't take too long before they begin to feel bored; their arousal level is too low and their level of performance or productivity is also typically lower. Generally, by the time fall semester starts, many students are ready to return to school. This is an example of how the arousal theory works.

General Adaptation Syndrome

In the 1930's a young medical student named Hans Selye became very interested in the relationship of stress and disease and for the next 50 years he systematically studied its relationship. One of his biggest contributions to the field of study was his development of the General Adaptation Syndrome. Selye found that there seemed to be a common or typical stress response pathway that people experienced when confronted with a stressor.

The pathway is simplified into three stages: Stage 1- Alarm, Stage 2- Resistance, and Stage 3- Exhaustion. This pathway begins when a person is exposed to a stressor and they are at first taken off guard and the body launches the Fight or Flight response (alarm stage). If the perceived stress continues, they attempt to maintain homeostasis by resisting the change (resistance stage). Our body wants to stay in homeostasis, which is a state of physiological calmness or balance, and occurs when our bodily functions are running smoothly in conjunction with low stress levels. Finally they eventually fall victim to exhaustion due to prolonged exposure to the stressor and depleting the bodies ability to cope to maintain homeostasis (exhaustion stage). Reaching the exhaustion stage

leads to illness due to the resulting wear and tear on the body which leads to suppressing the immune system and causing bodily functions to deteriorate. This can lead to a variety of health issues and illnesses, including heart disease, digestive problems, depression, and diabetes.

For example, you just find out that you have to pass a certification test in 2 months in order to keep your job and have not started studying. Your first reaction might be shock, anger, feelings of hopelessness, or anxiousness. This is the first stage, the alarm stage. You could choose to quit your job and flee from the stress, however you know how important it is, so you make a plan to prepare the test and include deep breathing exercises. In this stage you are resisting the stress with coping mechanisms. As the certification test gets closer you once again begin feeling stress, you might feel like you are doomed to fail this test and feel desperate, feel constantly anxious, have difficulty falling asleep and waking up in the morning. This is the exhaustion stage and where you will be more susceptible to getting sick. The exhaustion of this stage will have deleterious effects on your health by depleting your body resources which are crucial for the maintenance of normal functions. Your immune system will be exhausted and function will be impaired.

Psychoneuroimmunology (PNI)

Unlike the Yerkes-Dodson Law or the **General Adaptation Syndrome**, **Psychoneuroimmunology** (PNI) is not a model or framework, but rather a discipline of study. People who study the discipline of PNI study the relationship between the endocrine system, the nervous system, and the immune system to better understand the connection between the mind and the body.

For example, in the 19080's a married couple, one a psychologist and the other an immunologist, began to become aware of the growing body of research in PNI and realized they had a unique opportunity to bring their disciplines and perspectives together to add to the research on the relationship of stress and disease[1]. Rather than continue with research using animals, as many had before them, they wanted to study the connection between stress and immunity under more natural circumstances. This began years of researching medical students before, during, and after taking a very stressful 3-day exam. They found that the stressful exam brought about a decline in the students' Natural Killer cells, one of the main immune cells that fight off disease.

There is a wealth of research on how stress impacts immune functioning leading to the belief that every one of the hormones/transmitters secreted by these nervous system regions has been shown to have the potential, either in vivo or in vitro, to alter some aspect of immunity[2]. It has been found that chronic stress is an immunosuppresive, meaning that it suppresses the immune system not allowing the body to have an efficient and effective immune response. It is now well established that psychological factors, especially chronic stress, can lead to impairments in immune system functioning in both the young and older adults.

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1.3.3: Eustress

Hans Selye originally defined stress as the body's response to challenges. He was dismayed by the implication that all challenging events in life were unhealthy and undesirable. Stress was not always bad, he pointed out. Sometimes a challenge is a good thing. Indeed, one could argue that nothing useful in life can be accomplished without some degree of stress.

"Good stress," Selye pointed out, is "the spice of life." To combat the notion that all stress was bad, Selye developed the idea of eustress, which is a person's ideal stress level. Selye proposed that different people needed different levels of challenge or stimulation (stress) in their lives. Some people ("turtles") need low levels of stress. Others ("racehorses") thrive on challenges.

In the long run, the popular conception of stress as something bad proved to be more durable and accurate than Selye's notion of stress as a challenge to the system. In other words, the word stress continues to mean something bad (not something challenging) to most people. That seems to make the most sense, because psychologists found that only unpleasant stressors produced the harmful stress reaction identified by Selye (corticosteroid secretion). Challenges were not harmful in themselves. A person could be a busy executive or engage in strenuous exercise without experiencing negative stressrelated symptoms, as long as the person enjoyed the challenge.

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1.3.4: Stress is in the Eye of the Beholder

The process by which we influence the emotion we experience in a situation by the interpretation or cognitions we select in the experience is described by Lazarus's theory of appraisal as influencing our stress experience. This theory may be beneficial to our understanding of the differences between individual's stress levels. The theory's main points are:

1. When we experience a situation or event we first determine if it is a threat, a challenge, or is neutral.
2. We then assess our inventory of resources to cope with the event. If we do not perceive we are adequate to the task, we must be able to withdraw or we will feel trapped in a situation with aversive consequences coming. That induces distress and all the physiological processes that harm our health. If we perceive that we have the resources to successfully cope with the situation, we feel challenged and optimistic. Note that challenge and optimism are related to enhanced health and sense of wellbeing.

This second stage of appraisal impacts the first stage in a loop process. If we at first perceive a threat but then realize we can handle it, it reduces the distress and may even create a perception of challenge. If at first we perceive a challenge but then realize that we don't have what it takes to be successful, we may begin to experience distress as we see the aversive outcome of failure looming ahead. Depending on the meaning of the outcome to us, the distress may be mild or severe. If the situation is always hanging over us and we always feeling inadequate to it and anxious about negative outcomes, we are always under distress. Our health and well-being take a beating in that scenario.

Next, we must select from our repertoire of coping resources. There are two types of coping resources:

- Instrumental
- palliative (emotion-focused)

Instrumental coping solves the problem and removes the stressor from our experience as in working out a conflict with someone to reduce the distress or by getting a better job to reduce financial pressures.

Palliative coping alters our physiological reactions to stress that will not go away and cannot be escaped. These include relaxation skills, reinterpretation of the meaning or effects of the stressor, acceptance of the situation, or optimism about future improvements in the situation. Palliative skills would include relaxing in the traffic jam even though you have an important appointment that is being missed. You realize you cannot do anything about it, so you may as well relax because anger and tension will not make the cars move any faster, but it will hurt you, so you choose to relax instead.

As we go to our repertoire of coping skills to select one or more, we may become more optimistic of success and reappraise the situation in the first step. It may become less threatening and hence less distressful. We could find that our coping resources will be less adequate than we initially thought and we would become more threatened now. Even a challenge might be converted into a threat as in traveling to a another country for the first time and finding your credit cards are missing and you have no money for anything and no way to get any.

This interactive appraisal and coping process is at the heart of the impact of stress on us. If we interpret a situation as stressful, it has the stress-related effects on us. If we have few coping sources, more situations will be perceived as distressing. If we have many coping resources, more situations will be perceived as challenging or at least neutral.

As I am driving down the road and have a flat tire, I could be annoyed at the trouble it causes or highly threatened by the memory of Bill Cosby's son's murder a few years ago as he changed his tire. If I don't know how to change a tire and it is night time, I may feel very threatened as I perceive helplessness and vulnerability to someone's attacking me. If I assure myself that this is unlikely, and I do know how to change a tire, I may decide that I will get this done in ten minutes and be on the road safely. But then I find that my spare tire is flat. Now I feel threatened for sure. But if I have a good spare, have a good flashlight, have a handgun and the skill to use it, and have changed many tires, I may only feel annoyed at the hassle and not feel threatened (many instrumental skills). I may have none of these things but have a cell phone and a close friend who will quickly be here to solve the problem for me (social support). My distress is much less then.

These factual situations are part of the appraisal and coping process. Perception is also critically important. If I have little confidence in myself to handle a flat tire even though I have been taught how to do it and have the tire, I may feel more threatened. If I have the cell phone but don't believe I should bother anybody to come here, or don't believe they would want to help me, the facts do not determine my reaction as much as my perception of the facts determines it.

A second example of the role of coping skills and perception could involve getting started in this course. If you are a computer whiz and have taken several college courses including online courses before, you got started with little problem. Learning to use

Etudes, to take online quizzes probably did not cause much distress. But if you were new to using the Internet, had never taken an online course, and had low self-confidence, you may have been quite distressed. Same situation, different coping resources. Some of our community colleges go to great effort to be sure new online students have the knowledge and coping skills to begin a course with little stress.

Now add pure perception. If you perceive college as a supportive environment that will find a way to assist you to get through as long as you put forth the effort, and perceive instructors as willing to be flexible when circumstances are beyond all of our control, like getting started on the three programs we use and getting books late, you may be hassled but not threatened about failing the course because of these factors. But if you see colleges and instructors as money-hungry and deliberately placing obstacles in your path to cause you to fail and drop out, you have been very distressed when you had these difficulties as you would see no support or flexibility to allow you to adapt to the new situation and have the time to catch up. You might even feel quite angry at this new ploy to get your tuition and frustrate you into quitting. The reality of the college and instructor's intent make no difference in your initial perception and resultant choices. It is your perception of reality that determines what you will do.

The appraisal and coping process underlies the statement that "stress is in the eye of the beholder." Any event of situation may be perceived differently by different individuals due to past experience with it, learned skills, personality traits like Type A and optimism, and the amount of distress being experienced already. Social support may be instrumental in helping cope with problem as in coming to help with the flat tire, or being eager to listen and be supportive with your sharing your experiences. Both reduce the distress levels.

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1.3.5: Managing Stress

Everyone has to deal with stress. There are steps you can take to help you handle stress in a positive way and keep it from making you sick. Try these tips to keep stress in check:

Develop a new attitude

- Become a problem solver. Make a list of the things that cause stress. From your list, figure out which problems you can solve now and which are beyond your control for the moment. From your list of problems that you can solve now, start with the little ones. Learn how to calmly look at a problem, think of possible solutions, and take action to solve the problem. Being able to solve small problems will give you confidence to tackle the big ones. And feeling confident that you can solve problems will go a long way to helping you feel less stressed.
- Be flexible. Sometimes, it's not worth the stress to argue. Give in once in a while or meet people halfway.
- Get organized. Think ahead about how you're going to spend your time. Write a to-do list. Figure out what's most important to do and do those things first.
- Set limits. When it comes to things like work and family, figure out what you can really do. There are only so many hours in the day. Set limits for yourself and others. Don't be afraid to say NO to requests for your time and energy.

Relax

- Take deep breaths. If you're feeling stressed, taking a few deep breaths makes you breathe slower and helps your muscles relax.
- Stretch. Stretching can also help relax your muscles and make you feel less tense. Massage tense muscles. Having someone massage the muscles in the back of your neck and upper back can help you feel less tense.
- Take time for yourself. We all have lots of things that we have to do. But often we don't take the time to do the things that we really want to do. It could be listening to music, reading a good book, or going to a movie. Think of this as an order from your doctor, so you won't feel guilty!

Take care of your body

- Get enough sleep. Getting enough sleep helps you recover from the stresses of the day. Also, being well-rested helps you think better so that you are prepared to handle problems as they come up. Most adults need 7 to 9 hours of sleep a night to feel rested.
- Eat right. Try to fuel up with fruits, vegetables, beans, and whole grains. Don't be fooled by the jolt you get from caffeine or high-sugar snack foods. Your energy will wear off, and you could wind up feeling more tired than you did before.
- Get moving. Getting physical activity can not only help relax your tense muscles but improve your mood. Research shows that physical activity can help relieve symptoms of depression and anxiety.
- Don't deal with stress in unhealthy ways. This includes drinking too much alcohol, using drugs, smoking, or overeating.

Connect with others

- Share your stress. Talking about your problems with friends or family members can sometimes help you feel better. They might also help you see your problems in a new way and suggest solutions that you hadn't thought of.
- Get help from a professional if you need it. If you feel that you can no longer cope, talk to your doctor. She or he may suggest counseling to help you learn better ways to deal with stress. Your doctor may also prescribe medicines, such as antidepressants or sleep aids.
- Help others. Volunteering in your community can help you make new friends and feel better about yourself.

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1.3.6: Exercise and Stress

Exercise builds stronger bodies only if we push ourselves beyond our regular level of strength and endurance. Progressing in your intellectual skills occurs only by going beyond your adaptation level for the complexity and amount of knowledge you must acquire. Stress as "challenge" enhances physical and emotional well-being. Mountain climbers want risk and challenge, but they want the type that they feel they can master and mostly control. They don't want to be perfectly in control because then the challenge would not be so great. They want to be on the edge between in-control and having to use every degree of skill, concentration, and problem solving to succeed. The same is true of race car drivers, downhiill skiers, chess players, musicians, and artists.

These activities have been described by Csikszentmihalyi as inducing the experience of "flow" that totally captures the attention, makes it very easy to continue, and very hard to stop. There are many other activities and professions that produce "flow", but the essence of the experience is to be on the edge of challenge and failure with the perception that your own efforts will make the difference between good and bad outcomes. In these conditions stress builds healthier bodies and higher well-being. People who experience "flow" frequently report high degrees of satisfaction in life.

Physiological Toughness Model

There is also a psychophysiological framework for explaining how exercise cannot only reduce the immediate effects of stress but also can enhance the recovery from stressors. This framework is called the Physiological Toughness Model and it theorizes that intermittent but regular exposure to stressors, like exercise, can lead to psychological coping, emotional stability, and physiological changes. These physiological changes include increases in endorphins and reductions in stress hormones and lead to improvements in performance during challenging/threatening situations, strengthening of immune system functioning, and improvements in stress tolerance.

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1.3.7: Meditation and Health

Many people practice meditation for a number of health-related purposes. A 2007 national government survey found that 9.4% of respondents had used meditation in the past 12 months.

What is meditation?

The term meditation refers to a group of techniques which may be practiced for many reasons, such as to increase calmness and physical relaxation, to improve psychological balance, to cope with illness, or to enhance overall wellness. Most types of meditation have four elements in common:

- A quiet location. Meditation is usually practiced in a quiet place with as few distractions as possible. This can be particularly helpful for beginners.
- A specific, comfortable posture. Depending on the type being practiced, meditation can be done while sitting, lying down, standing, walking, or in other positions.
- A focus of attention. Focusing one's attention is usually a part of meditation. For example, the meditator may focus on a mantra (a specially chosen word or set of words), an object, or the sensations of the breath.
- Having an open attitude. During meditation this means letting distractions come and go naturally without judging them.

How can meditation affect my health?

It is not fully known what changes occur in the body during meditation; whether they influence health; and, if so, how. Research is under way to find out more about meditation's effects, how it works, and diseases and conditions for which it may be most helpful. The National Center for Complementary and Alternative Medicine (NCCAM) is the federal government's lead agency for scientific research on complementary and alternative medicine (CAM). Some recent NCCAM-supported studies have been investigating meditation for relieving stress in caregivers for elderly patients with dementia and for relieving asthma symptoms.

Is meditation right for me?

Meditation is considered to be safe for healthy people, but if you are thinking about using meditation practices to prevent asthma attacks, to control high blood pressure, to reduce arthritis pain, or for any other medical reason, be smart.

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1.3.8: Relaxation Techniques

Relaxation techniques include a number of practices such as progressive relaxation, guided imagery, biofeedback, self-hypnosis, and deep breathing exercises. The goal is similar in all: to consciously produce the body's natural relaxation response, characterized by slower breathing, lower blood pressure, and a feeling of calm and well-being.

Relaxation techniques (also called relaxation response techniques) may be used by some to release tension and to counteract the ill effects of stress. Relaxation techniques are also used to induce sleep, reduce pain, and calm emotions. This fact sheet provides a general overview of relaxation techniques and suggests sources for additional information.

Key Points

- Relaxation techniques are used for a variety of health-related purposes, such as counteracting the effects of stress on the body.
- Most relaxation techniques can be self-taught and self-administered.
- Relaxation techniques are generally safe, but there is limited evidence of usefulness for specific health conditions. Research is under way to find out more about relaxation and health outcomes.
- Do not use relaxation techniques as a replacement for conventional care or to postpone seeing a doctor about a medical problem.
- Tell your health care providers about any complementary and alternative practices you use. Give them a full picture of what you do to manage your health. This will help ensure coordinated and safe care.

About Relaxation Techniques

Relaxation is more than a state of mind; it physically changes the way your body functions. When your body is relaxed breathing slows, blood pressure and oxygen consumption decrease, and some people report an increased sense of well-being. This is called the "relaxation response." Being able to produce the relaxation response using relaxation techniques may counteract the effects of long-term stress, which may contribute to or worsen a range of health problems including depression, digestive disorders, headaches, high blood pressure, and insomnia.

Relaxation techniques often combine breathing and focused attention on pleasing thoughts and images to calm the mind and the body. Most methods require only brief instruction from a book or experienced practitioner before they can be done without assistance. These techniques may be most effective when practiced regularly and combined with good nutrition, regular exercise, and a strong social support system.

Some relaxation response techniques include:

- **Autogenic training**: When using this method, you focus on the physical sensation of your own breathing or heartbeat and picture your body as warm, heavy, and/or relaxed.
- **Biofeedback**: Biofeedback-assisted relaxation uses electronic devices to teach you how to consciously produce the relaxation response. Biofeedback is sometimes used to relieve conditions that are caused or worsened by stress.
- **Deep breathing or breathing exercises:** To relax using this method, you consciously slow your breathing and focus on taking regular and deep breaths.
- **Guided imagery:** For this technique, you focus on pleasant images to replace negative or stressful feelings and relax. Guided imagery may be directed by you or a practitioner through storytelling or descriptions designed to suggest mental images (also called visualization).
- **Progressive relaxation:** (also called Jacobson's progressive relaxation or progressive muscle relaxation). For this relaxation method, you focus on tightening and relaxing each muscle group. Progressive relaxation is often combined with guided imagery and breathing exercises.
- **Self-Hypnosis:** In self-hypnosis you produce the relaxation response with a phrase or nonverbal cue (called a "suggestion"). Self-hypnosis may be used to relieve pain (tension headaches, labor, or minor surgery) as well as to treat anxiety and irritable bowel syndrome.

Use of Relaxation Techniques for Health in the United States

People may use relaxation techniques as part of a comprehensive plan to treat, prevent, or reduce symptoms of a variety of conditions including stress, high blood pressure, chronic pain, insomnia, depression, labor pain, headache, cardiovascular disease, anxiety, chemotherapy side effects, and others. According to the 2007 National Health Interview Survey, which included a comprehensive survey of complementary and alternative medicine (CAM) use by Americans, 12.7 percent of American adults use

deep-breathing exercises, 2.9 percent used progressive relaxation, and 2.2 percent used guided imagery for health purposes. Most of those people reported using a book to learn the techniques rather than seeing a practitioner.

To understand how consciously producing the relaxation response may affect your health, it is helpful to understand how your body responds to the opposite of relaxation—stress. When you're under stress, your body releases hormones that produce the "fight-or-flight response:" Heart rate and breathing rate go up and blood vessels narrow (restricting the flow of blood). This response allows energy to flow to parts of your body that need to take action, for example the muscles and the heart. However useful this response may be in the short term, there is evidence that when your body remains in a stress state for a long time, emotional or physical damage can occur. Long-term or chronic stress (lasting months or years) may reduce your body's ability to fight off illness and lead to or worsen certain health conditions. Chronic stress may lead to high blood pressure, headaches, stomach ache, and other symptoms. Stress may worsen certain conditions, such as asthma. Stress also has been linked to depression, anxiety, and other mental illnesses.

In contrast to the stress response, the relaxation response slows the heart rate, lowers blood pressure, and decreases oxygen consumption and levels of stress hormones. Because relaxation is the opposite of stress, the theory is that voluntarily creating the relaxation response through regular use of relaxation techniques could counteract the negative effects of stress.

Status of Research on Relaxation Techniques

In the past 30 years, there has been considerable interest in the relaxation response and how inducing this state may benefit health. Research has focused primarily on illness and conditions in which stress may play a role either as the cause of the condition or as a factor that can make the condition worse. Currently, there is some evidence that relaxation techniques may be an effective part of an overall treatment plan for some disorders, including:

- **Anxiety**: Studies have suggested that relaxation may assist in the treatment of phobias or panic disorder. Relaxation techniques have also been used to relieve anxiety for people in stressful situations, such as when undergoing a medical procedure.
- **Depression**: In 2008, a major review of the evidence for relaxation in the treatment of depression found that relaxation techniques were more effective than no treatment for depression, but not as effective as cognitive-behavioral therapy.
- **Headache**: There is some evidence that biofeedback and other relaxation techniques may be helpful for relieving tension or migraine headaches. In some cases, these mind and body techniques were more effective than medications for reducing the frequency, intensity, and severity of headaches.
- **Pain:** Some studies have shown that relaxation techniques may help reduce abdominal and surgery pain.

The results of research on relaxation to promote overall health or well-being or to treat other health conditions have been mixed or unclear. These conditions include:

- **High blood pressure:** A 2008 review of evidence for relaxation in the treatment of high blood pressure found some evidence that progressive muscle relaxation lowered blood pressure a small amount. However, the review found no evidence that this effect was enough to reduce the risk of heart disease, stroke, or other health issues due to high blood pressure. In a recent randomized controlled trial, 8 weeks of relaxation response/stress management was shown to reduce systolic blood pressure in hypertensive older adults, and some patients were able to reduce hypertension medication without an increase in blood pressure.
- **Asthma**: Several reviews of the literature have suggested that relaxation techniques, including guided imagery, may temporarily help improve lung function and quality of life and relieve anxiety in people with asthma. A more recent randomized clinical trial of asthma found that relaxation techniques may help improve immune function. More studies are needed to confirm this finding.
- **Nausea**: Relaxation techniques may help relieve nausea caused by chemotherapy. Fibromyalgia. Although some preliminary studies report that using relaxation or guided imagery techniques may sometimes improve pain and reduce fatigue from fibromyalgia, more research is needed. Irritable bowel syndrome. Some studies have indicated that relaxation techniques may prevent or relieve symptoms of irritable bowel syndrome (IBS) in some participants. One review of the research found some evidence that selfhypnosis may be useful in the treatment of IBS.
- **Heart disease and heart symptoms:** Researchers have looked at relaxation techniques for the treatment of angina and the prevention of heart disease. When a cardiac rehabilitation program was combined with relaxation response training in a clinic, participants experienced significant reductions in blood pressure, decreases in lipid levels, and increases in psychological functioning when compared to participants' status before the program. Although studies have shown that relaxation techniques combined with other lifestyle changes and standard medical care may reduce the risk of recurrent heart attack, more study is needed.
- **Insomnia**: There is some evidence that relaxation techniques can help in treating chronic insomnia.

Researchers have found some evidence on the effectiveness of relaxation techniques for:

- **Temporomandibular disorder:** (pain and loss of motion in the jaw joints). A review of the literature found that relaxation techniques and biofeedback were more effective than placebo in decreasing pain and increasing jaw function.
- **Ringing in the ears:** Use of relaxation exercises may help patients cope with the condition.
- **Smoking cessation:** Relaxation exercises may help reduce the desire to smoke.
- **Overactive bladder**: Bladder re-training combined with relaxation and other exercises may help control urinary urgency.
- **Nightmare:** Relaxation exercises may be effective in treating nightmares of unknown cause and those associated with posttraumatic stress disorder.
- **Hot flashes:** Relaxation exercises involving slow, controlled deep breathing may help relieve hot flashes associated with menopause.

Researchers have found no significant change in outcomes from relaxation techniques used during cardiac catheterization. However, patients experienced less distress prior to the procedure. Future research may investigate whether this has any long-term effect on outlook and recovery. Many of the studies of relaxation therapy and health have followed a small number of patients for weeks or months. Longer studies involving more participants may reveal more about the cumulative effects of using relaxation techniques regularly.

Side Effects and Risks

Relaxation techniques are generally considered safe for healthy people. There have been rare reports that certain relaxation techniques might cause or worsen symptoms in people with epilepsy or certain psychiatric conditions, or with a history of abuse or trauma. People with heart disease should talk to their doctor before doing progressive muscle relaxation. Relaxation techniques are often used as part of a treatment plan and not as the sole treatment for potentially serious health conditions.

If You Are Thinking About Using Relaxation Techniques for Health

- Do not use relaxation techniques as a replacement for conventional care or to postpone seeing a doctor about a medical problem.
- Ask about the training and experience of the practitioner or instructor you are considering for any complementary alternative medicine practice.
- Look for published research studies on relaxation for the health condition in which you are interested. Remember that some claims for using relaxation therapies may exceed the available scientific evidence.
- Tell all your health care providers about any complementary and alternative practices you use. Give them a full picture of what you do to manage your health. This will help ensure coordinated and safe care.

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1.3.9: The Importance of Sleep

Sleep is an important part of your daily routine—you spend about one-third of your time doing it. It is estimated that about 1 in 3 adults, and even more adolescents, don't get enough sleep, which can affect their health and well-being. People who don't get enough sleep are more likely to have health problems like obesity, diabetes, heart disease, stroke, dementia, and cancer. They're also more likely to have trouble at work or school. In addition, about 100,000 motor vehicle crashes every year in the United States are related to drowsy driving. It is recognized that improving sleep habits and sleep environments can help people stay healthy and safe. Thus, is is not surprising that one of the goals of Healthy People 2030 is to improve health, productivity, well-being, quality of life, and safety by helping people get enough sleep.

Getting good sleep is not just about the quantity of sleep, but also the quality of sleep. Healthy sleep requires adequate duration, good quality, appropriate timing and regularity, and the absence of sleep disturbances or disorders.

Recommended Sleep Quantity

The American Academy of Sleep Medicine recommends that adults should sleep 7 hours or more per night on a regular basis to promote optimal health.

Table 1.3.9.1 : How much sleep do I need?[7]

Age Group	Recommended Hours of Sleep Per Day
0–3 months	14–17 hours (National Sleep Foundation) No recommendation (American Academy of Sleep Medicine)
4–12 months	12–16 hours per 24 hours (including naps)
1–2 years	11–14 hours per 24 hours (including naps)
3–5 years	10–13 hours per 24 hours (including naps)
6–12 years	9–12 hours per 24 hours
13–18 years	8–10 hours per 24 hours
18–60 years	7 or more hours per night
61–64 years	7–9 hours
65 years and older	7–8 hours

Healthy Sleep Habits

Tips for healthy sleep habits[8] include:

- Keep a consistent sleep schedule. Get up at the same time every day, even on weekends or during vacations.
- Set a bedtime that is early enough for you to get at least 7-8 hours of sleep.
- Don't go to bed unless you are sleepy.
- If you don't fall asleep after 20 minutes, get out of bed. Go do a quiet activity without a lot of light exposure. It is especially important to not get on electronics.
- Establish a relaxing bedtime routine.
- Use your bed only for sleep and sex.
- Have a warm shower/bath or a cup of herbal tea
- Make your bedroom quiet and relaxing. Keep the room at a comfortable, cool temperature.
- Do your best to avoid having disruptive pets, children, partners sleep with you
- Make sure your room is pitch black or use a sleep mask over your eyes
- Limit exposure to bright light in the evenings.
- Turn off electronic devices at least 30 minutes before bedtime.
- Don't eat a large meal before bedtime. If you are hungry at night, eat a light, healthy snack.
- Exercise regularly and maintain a healthy diet.
    - The time we spend doing moderate to vigorous activity throughout or day will benefit our sleep. Strong evidence demonstrates that moderate-to-vigorous physical activity improves the quality of sleep in adults. It does so by reducing the

length of time it takes to go to sleep and reducing the time one is awake after going to sleep and before rising in the morning. It also can increase the time in deep sleep and reduce daytime sleepiness. The improvements in sleep with regular physical activity are also reported by people with insomnia and obstructive sleep apnea. In children, the more they are sedentary the lower their sleep duration.

- Avoid consuming caffeine in the afternoon or evening.
- Avoid consuming alcohol before bedtime.
- Reduce your fluid intake before bedtime.

Understanding Sleep

The National Sleep Foundation provides helpful information about the basics of sleep including understanding circadian rhythms and the sleep cycle[9].

Major advances in sleep science have occurred over the past half-century since the discovery of rapid eye movement (REM) sleep in 1953[10].

Circadian Rhythm

Have you heard the term circadian rhythm? Circadian means “recurring naturally on a twenty-four-hour cycle, even in the absence of light fluctuations,” it is sometimes called the “body clock.” When we talk about circadian rhythms, it’s mostly in relation to sleep.

Circadian rhythms are physical, mental, and behavioral changes that follow a 24-hour cycle. Your circadian rhythm is regulated by your bodies biological clock, which is an organisms’ natural timing device. The master clock in the brain is a group of about 20,000 nerve cells (neurons) and coordinates all the biological clocks in a living thing, keeping the clocks in sync. Without the right signals from your body’s internal master clock, you might not fall asleep, have fragmented or sleep poorly, or wake up too early and not be able to fall back to sleep.

Your body’s biological clock produces circadian rhythms and regulates the timing of things in your body, like when you want to sleep or eat. Your circadian rhythm can influence important functions in your body such as releasing hormones, your eating habits, and your body temperature. For example, your digestive system produces proteins to make sure you eat on schedule, and the endocrine system regulates hormones to match your energy expenditures during the day.

Although natural factors in your body produce circadian rhythms, the environment, such as daylight, exercise, and temperature, also affect them. For example if you experience jet lag or change to working a night shift it could impact your light-dark cycle. The light from electronic devices at night can also confuse your biological clock and impact your circadian rhythm.

Sleep Stages (Sleep Cycle)

In 1953 there was a breakthrough in sleep science, this is when our understanding of what happens during sleep drastically changed. Prior to the 1950’s it was thought that our brains just shutdown when we slept, however in the 19050’s scientist learned that our brains do not shutdown, rather they cycle through several different stages of sleep. Dr. Nathaniel Kleitman was an American physiologist known as the Father of American sleep research, he and his students discovered what we now call REM sleep, or rapid eye movement sleep. Prior to the incredible work produced by Kleitman, it was thought that the brain and body were in a completely inactive state during sleep. It was discovered that over the course of one night, your body goes through the sleep stages every 90 minutes or so. Sleep stages last for different periods of time depending on the age of the sleeper, but generally speaking non-REM cycles are longer in the beginning of the night while REM cycles are longer later in the night.

There are two types of sleep: Non-REM and REM sleep. Non-REM sleep is furthered divided into three stages (stage 1, stage 2, stage 3) where distinct brain activity occurs. REM sleep involves more brain activity than Non-REM and is considered a more “wakeful” state, as your heart rate and blood pressure increase to levels close to what you experience when you are awake. While all sleep stages are important, Stage 3 and REM sleep have unique benefits. One to two hours of Stage 3 deep sleep per night will keep the average adult feeling restored and healthy. If you’re regularly waking up tired, it could be that you’re not spending enough time in that deep sleep phase. Meanwhile, REM sleep helps your brain consolidate new information and maintain your mood – both critical for daily life. Talk to your health care provider if you feel you are not getting the restful sleep that you need.

The Four Sleep Stages (cycles)

Stage 1 (Non-REM)

Stage 1 of the sleep cycle is the lightest phase of sleep and generally lasts about seven minutes. The sleeper is somewhat alert and

can be woken up easily. During this stage, the heartbeat and breathing slow down while muscles begin to relax. The brain produces alpha and theta waves.

Stage 2 (Non-REM)
In Stage 2, the brain creates brief bursts of electrical activity known as “sleep spindles” that create a distinct sawtooth pattern on recordings of brain activity. Eventually, the waves continue to slow down. Stage 2 is still considered a light phase of sleep, but the sleeper is less likely to be awakened. Heart rate and breathing slow down even more, and the body temperature drops. This stage lasts around 25 minutes.

Stage 3 (Non-REM)
This stage represents the body falling into a deep sleep, where slow wave sleep occurs. The brain produces slower delta waves, and there’s no eye movement or muscle activity from the sleeper. As the brain produces even more delta waves, the sleeper enters an important restorative sleep stage from which it’s difficult to be awakened. This phase of deep sleep is what helps you feel refreshed in the morning. It’s also the phase in which your body repairs muscle and tissue, encourages growth and development, and improves immune function.

Stage 4 – REM Sleep
About 90 minutes after falling asleep, your body enters REM sleep, which stands for Rapid Eye Movement sleep and is named so for the way your eyes quickly move back and forth behind your eyelids. REM sleep is thought to play a role in central nervous system development in infants, which might explain why infants need more REM sleep than adults. This sleep pattern is characterized by dreaming, since your brain is very active during this stage. Physically, your body experiences faster and irregular breathing, increased heart rate, and increased blood pressure; however, your arm and leg muscles become temporarily paralyzed, stopping you from acting out your dreams. REM sleep increases with each new sleep cycle, starting at about ten minutes during the first cycle and lasting up to an hour in the final cycle. Stage 4 is the last stage before the cycle repeats. REM sleep is critical for learning, memory, daytime concentration, and your mood. REM sleep plays a significant role in helping your brain consolidate and process new information and then retain the information in your long-term memory. Without REM sleep, your immune system could be weakened, you may experience pain more deeply, poor memory, mood dysfunction, less ability to focus, and the growth of new healthy cells and tissue in the body might be blocked. Poor REM sleep may be due to sleep disorders such as insomnia or obstructive sleep apnea, which causes you to wake during the night.

Sleep Disorders

Quality of sleep is impacted by several types of sleep disorders[11] including insomnia, hypersomnias (or excessive sleep), circadian rhythm sleep-wake disorders, parasomnias (or sleep events), sleep-related breathing disorders, or sleep-related movement disorders. Sleep disorders, like sleep apnea, negatively affect people’s health and safety, and many adults who have a sleep disorder don’t get the treatment they need.

Raising awareness about sleep disorders can help people recognize symptoms and get the help they need. The American Academy of Sleep Medicine (AASM) provides extensive information and resources about sleep disorders to help inform you about the different types, symptoms, and treatments.

Challenge: Understand Your Sleep

A sleep diary is a useful way to track your sleep at home by recording when you went to bed, woke during the night, and woke in the morning. It is helpful to also track the time of day when you exercise, nap, or take a medication, and when you have caffeine or alcohol.

A sleep diary will help you understand your sleep pattern and how much sleep you’re getting. It also will show how often you have disrupted sleep. It may also will help you note certain activities that can affect your sleep.

Keeping a sleep diary is very helpful for communicating with your doctor about your sleep.

Use the AASM Sleep Diary

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1.3.10: More Strategies for Coping with Stress

We know that everyone has stress in their lives and a little stress may be helpful, but too much stress can lead to illness. It is important to recognize the stress in your life and then take action to handle stress in a positive way and keep it from making you sick.

Cognitive strategies to reduce stress

Cognitive strategies to reduce stress are focused on how you think. These strategies can help you to develop a new attitude in regards to stress in your life.

- Become a problem solver.
  - Make a list of the things that cause you stress. From your list, figure out which problems you can solve now and which are beyond your control for the moment. From your list of problems that you can solve now, start with the little ones. Learn how to calmly look at a problem, think of possible solutions, and take action to solve the problem. Being able to solve small problems will give you confidence to tackle the big ones. And feeling confident that you can solve problems will go a long way to helping you feel less stressed.
- Be flexible.
  - Sometimes, it's not worth the stress to argue. Give in once in a while or meet people halfway.
- Get organized.
  - Think ahead about how you're going to spend your time. Write a to-do list. Figure out what's most important to do and do those things first.
- Set limits.
  - When it comes to things like work and family, figure out what you can really do. There are only so many hours in the day. Set limits for yourself and others. Don't be afraid to say NO to requests for your time and energy.
- Set priorities
  - Decide what must get done and what can wait, and learn to say no to new tasks if they are putting you into overload.
- Reward accomplishments
  - Recognize what you have accomplished at the end of the day, not what you have been unable to do.
- Build your Resilience
  - Resilience refers to the ability of an individual, family, organization, or community to cope with adversity and adapt to challenges or change. Everyone will experience hardships in life from everyday challenges to traumatic events and each person reacts to the challenges differently. Being resilient does not mean that a person does not experience difficulty or distress but it may help you adapt well over time to stressful situations.
  - Resilience is the ability to:
    - Bounce back
    - Take on difficult challenges and still find meaning in life
    - Respond positively to difficult situations
    - Rise above adversity
    - Cope when things look bleak
    - Tap into hope
    - Transform unfavorable situations into wisdom, insight, and compassion
    - Endure

Relaxation Strategies to Reduce Stress

Taking time to relax is helpful response to stress in your life. There are many ways you can purposefully relax, here are a few techniques to try:

Stretch

Stretching can also help relax your muscles and make you feel less tense.

Get a Massage

Having someone massage the muscles in the back of your neck and upper back can help you feel less tense.

Do something you love

Take time to do something you want to do. We all have lots of things that we have to do. But often we don't take the time to do the things that we really want to do. It could be listening to music, reading a good book, or going to a movie. Think of this as an order from your doctor, so you won't feel guilty!

Practice Deep Breathing

When we become stressed, one of our body's automatic reactions is shallow, rapid breathing which can increase our stress response. Taking deep, slow breaths is an antidote to stress and is one way we can "turn-off" our stress reaction and "turn-on" the relaxation response. Deep breathing is the foundation of many other relaxation exercises.

Deep breathing activity:

- Get into a comfortable position, either sitting or lying down.
- Put one hand on your stomach, just below your rib cage.
- Slowly breathe in through your nose. Your stomach should feel like rising and expanding outward.
- Exhale slowly through your mouth, emptying your lungs completely and letting your stomach fall.
- Repeat several times until you feel relaxed.
- Practice several times a day.
- Try this guided video for Deep Breathing

Use Guided Imagery

In guided imagery, you picture objects, scenes, or events that are associated with relaxation or calmness and attempt to produce a similar feeling in your body.

- Sit or lie down in a comfortable position, with eyes closed.
- Start by just taking a few deep breaths to help you relax.
- Picture a setting that is calm and peaceful. This could be a beach, a mountain setting, a meadow, or a scene that you choose.
- Imagine your scene, and try to add some detail. For example, is there a breeze? How does it feel? What do you smell? What does the sky look like? Is it clear, or are there clouds?
- It often helps to add a path to your scene. For example, as you enter the meadow, imagine a path leading you through the meadow to the trees on the other side. As you follow the path farther into the meadow you feel more and more relaxed.
- When you are deep into your scene and are feeling relaxed, take a few minutes to breathe slowly and feel the calm.
- Think of a simple word or sound that you can use in the future to help you return to this place. Then, when you are ready, slowly take yourself out of the scene and back to the present.
- Tell yourself that you will feel relaxed and refreshed and will bring your sense of calm with you.
- Count to 3, and open your eyes. Notice how you feel right now.
- Try this guided video for practicing Imagery

Practice Progressive Muscle Relaxation

In Progressive Muscle Relaxation you reduce muscular tension and negative feelings by learning how to relax and relieve the muscular tension. The key to the relaxation process is taking some deep breaths and then proceeding to tense, then relax a group of muscles in a systematic order.

- Sit in a comfortable position, with eyes closed. Take a few deep breaths, expanding your belly as you breathe air in and contracting it as you exhale.
- Begin at the top of your body, and go down. Start with your head, tensing your facial muscles, squeezing your eyes shut, puckering your mouth and clenching your jaw. Hold, then release and breathe.
- Tense as you lift your shoulders to your ears, hold, then release and breathe.
- Make a fist with your right hand, tighten the muscles in your lower and upper arm, hold, then release. Breathe in and out. Repeat with left hand.
- Concentrate on your back, squeezing shoulder blades together. Hold, then release. Breathe in and out.
- Suck in your stomach, hold, then release. Breath in and out.

- Clench your buttocks, hold, then release. Breathe in and out.
- Tighten your right hamstring, hold then release. Breathe in and out. Repeat with left hamstring.
- Flex your right calf, hold, then release. Breathe in and out. Repeat with left calf.
- Tighten toes on your right foot, hold, then release. Breathe in and out. Repeat with left foot.
- Try this guided video for Progressive Muscle Relaxation

Practice Meditation

Meditation is about clearing your mind. There are many types of meditation, but most have four elements in common: a quiet location with as few distractions as possible; a specific, comfortable posture (sitting, lying down, walking, or in other positions); a focus of attention (a specially chosen word or set of words, an object, or the sensations of the breath); and an open attitude (letting distractions come and go naturally without judging them).

- Sit in a comfortable position, with eyes closed.
- Set a time limit such as five or 10 minutes.
- Notice how your body feels
- Focus on your breath. Follow the sensation of your breath as it goes in and as it goes out.
- Notice when your mind has wandered and simply return your attention back to your breath. It is normal for your mind to wander, just come back.
- When time is up, take a moment and notice any sounds in the environment. Notice how your body feels right now. Notice your thoughts and emotions. Show yourself kindness and appreciation.
- Try this guided video for 5 Minute Mindful Meditation to be more Calm

Behavioral Strategies to Reduce Stress

It is important to take care of your body, especially when you are experience a lot of stress in your life.

Listen to your body

Recognize signs of your body's response to stress, such as difficulty sleeping, increased alcohol and other substance use, being easily angered, feeling depressed, and having low energy.

Get enough sleep

Getting enough sleep helps you recover from the stresses of the day. Also, being well-rested helps you think better so that you are prepared to handle problems as they come up. Most adults need 7 to 9 hours of sleep a night to feel rested.

Eat right

Try to fuel up with fruits, vegetables, beans, and whole grains. Don't be fooled by the jolt you get from caffeine or high-sugar snack foods. Your energy will wear off, and you could wind up feeling more tired than you did before.

Get moving

Getting physical activity can not only help relax your tense muscles but improve your mood. Research shows that physical activity can help relieve symptoms of depression and anxiety.

Avoid counterproductive actions

Don't deal with stress in unhealthy ways. This includes drinking too much alcohol, using drugs, smoking, or overeating.

Explore stress coping programs, which may incorporate meditation, yoga, tai chi, or other gentle exercises.

Social Strategies to Reduce Stress

Connecting with others is a helpful strategy for stress reduction.

Share your stress

Talking about your problems with friends or family members can sometimes help you feel better. They might also help you see your problems in a new way and suggest solutions that you hadn't thought of.

Get help from a professional if you need it

If you feel that you can no longer cope, talk to your doctor. She or he may suggest counseling to help you learn better ways to deal with stress. Your doctor may also prescribe medicines, such as antidepressants or sleep aids. Get proper health care for existing or new health problems.

Help others

Volunteering in your community can help you make new friends and feel better about yourself.

Activity: Reduce stress in 10-15 minutes

You can reduce stress in 10-15 minutes with one of the following activities:

- Get outside. Take a nature walk or city hike. Remember to wear a mask and stay 6 feet from others.
- Take a dance break!
- Write three things you are grateful for today.
- Giving back to others can help you too. Take a look at volunteer opportunities that interest you through a site such as VolunteerMatch.
- Take a break from the news today… watch or listen to something fun.
- Wash your face or rinse your hands in cool water to reduce tension and calm nerves.
- Check in with a friend, family member or neighbor. Talk by phone, video chat or visit in person while maintaining proper distance and wearing masks.
- Close your eyes, take deep breaths, stretch or meditate.
- Laugh! Think of someone who makes you laugh or the last time you laughed so hard you cried.
- Channel your energy into a quick cleaning of your home.
- Exercise. Lift weights. Do push-ups or sit-ups. Kick around a soccer ball.
- Make and enjoy a cup of tea and relax in a comfortable place.
- Consider a new hobby, such as playing a musical instrument, gardening, trying a new recipe, working on a crossword puzzle or knitting.
- Connect with your faith through prayer or reach out to a member of your faith community.
- If you've been feeling overwhelmed with stress, anxiety, sadness or depressed mood, use this time to make an appointment with a counselor.
- Check in with yourself—take time to ask yourself how you are feeling.
- Curl up with a book or magazine in a comfortable place.
- Practice relaxation exercises or yoga.
- Find an inspiring song or quote and write it down (or screenshot it) so you have it nearby.

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1.3.11: Resilience

Resilience is the ability to:

- Bounce back
- Take on difficult challenges and still find meaning in life
- Respond positively to difficult situations
- Rise above adversity
- Cope when things look bleak
- Tap into hope
- Transform unfavorable situations into wisdom, insight, and compassion
- Endure

Resilience refers to the ability of an individual, family, organization, or community to cope with adversity and adapt to challenges or change. It is an ongoing process that requires time and effort and engages people in taking a number of steps to enhance their response to adverse circumstances. Resilience implies that after an event, a person or community may not only be able to cope and recover, but also change to reflect different priorities arising from the experience and prepare for the next stressful situation.

Resilience is the most important defense people have against stress. It is important to build and foster resilience to be ready for future challenges. Resilience will enable the development of a reservoir of internal resources to draw upon during stressful situations.

Research (Aguirre, 2007; American Psychological Association, 2006; Bonanno, 2004) has shown that resilience is ordinary, not extraordinary, and that people regularly demonstrate being resilient.

Resilience is not a trait that people either have or do not have. Resilience involves behaviors, thoughts, and actions that can be learned and developed in anyone. Resilience is tremendously influenced by a person's environment.

Resilience changes over time. It fluctuates depending on how much a person nurtures internal resources or coping strategies. Some people are more resilient in work life, while others exhibit more resilience in their personal relationships. People can build resilience and promote the foundations of resilience in any aspect of life they choose.

Building Resilience

Developing resilience is a personal journey. People do not react the same way to traumatic events. Some ways to build resilience include the following actions:

- Making connections with others
- Looking for opportunities for self-discovery
- Nurturing a positive view of self
- Accepting that change is a part of living
- Taking decisive actions
- Learning from the past

The ability to be flexible is a great skill to obtain and facilitates resilience growth. Getting help when it is needed is crucial to building resilience. An approach to building resilience that works for one person might not work for another. People use varying strategies. Resilience involves maintaining flexibility and balance in life during stressful circumstances and traumatic events. Being resilient does not mean that a person does not experience difficulty or distress. Emotional pain and sadness are common in people who have suffered major adversity or trauma in their lives. Stress can be dealt with proactively by building resilience to prepare for stressful circumstances, while learning how to recognize symptoms of stress. Fostering resilience or the ability to bounce back from a stressful situation is a proactive mechanism to managing stress.

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1.3.12: End-of-Chapter Material

Key takeaways for this Chapter

- Stressor is something in your life that causes stress.
- The stress response is your physical, emotional, and behavioral response to stressors.
- Stressor + Stress Response = Stress
- The fight or flight response is the bodies physical response to stressors
- The fight or flight response is very important for escaping danger, however is elicited at any level of stress, either acute or long term.
- People have varying emotional and behavioral responses to stress.
- It is important to use productive behavioral responses rather than counter-productive responses.
- Some stress is good for you!
- Too much negative stress is associated with disease.
- You can take purposeful actions to reduce stress in your life.
- You can get help with stress by visiting our campus health professionals: they are free and provide confidential services.

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1.3.12.1: Stress- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

Does stress cause pimples?



How stress affects your body



How stress affects your brain



How to gain control of your free time



How to make stress your friend



How to resolve racially stressful situations



How to stop languishing and start finding flow



The cost of work stress — and how to reduce it



The cure for burnout (hint: it isn’t self-care)



The routines, rituals and boundaries we need in stressful times



The surprising link between stress and memory



Why you should define your fears instead of your goals



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1.3.13: Stress- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

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Why you should define your fears instead of your goals



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SECTION OVERVIEW

1.4: Preventing Injuries and Violence

Learning Outcomes

By the end of this chapter you will be able to:

- Recognize the common types of unintentional and intentional injuries
- Identify ways to reduce chances of unintentional and intentional injuries
- Explain how risk from injury changes throughout life stages.

What steps can you take to reduce the chances of accidental injuries?

How can you reduce chances of injuries from violence?

There are many choices you make in life that impact your health and well-being and some of those choices, like smoking cigarettes, have a direct connection to a negative health implication, like lung cancer. Although the choices you make may or may not directly impact the possibility of suffering intentional and unintentional injuries, understanding the most common reasons for injury can help you increase your safety.

1.4.1: Introduction to Intentional and Unintentional Injuries

1.4.2: Unintentional Injuries

1.4.3: Intentional Injuries - Violence

1.4.4: End-of-Chapter Material

1.4.5: Preventing Violence and Injury- Optional Continued Learning

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1.4.1: Introduction to Intentional and Unintentional Injuries

Throughout the world, injuries, both unintentional and violence-related, take the lives of 4.4 million people each year (nearly 8% of all deaths). For people ages 5-29, three of the top five causes of death are injury-related. In the United States, unintentional injuries are the leading cause of death in children, adolescents, and adults younger than 45 years. In 2018, unintentional injuries were the cause of 24.8 million people to visit their doctor and 97.9 million to visit the emergency room with an additional 1.2 million visited the emergency room due to an assault. Unintentional injuries ranked as the 4th overall leading cause of death in 1980, increased to the 3rd leading cause of death by 2018, and moved back to 4th in 2020 when COVID took the 3rd ranking. Some good news is that data from 1950-2018 show a reduction in deaths due to unintentional injuries from 78 per 100,000 to 48 per 100,000, however homicide has remained relatively the same from 5.1 to 5.9 per 100,000 people [1].

Injuries and violence cost billions of dollars each year in health care costs, lost productivity and law enforcement. There are also numerous costs to personal well-being including:

- Premature death
- Years of potential life lost
- Disability and disability-adjusted life years lost
- Poor mental health
- Increased risk of suicide
- High medical costs
- Lost productivity
- Chronic diseases like heart disease, diabetes and cancer
- Social problems such as poverty, crime and violence

Both intentional and unintentional injuries are public health concerns that are addressed worldwide and in the U.S. The National Center for Injury Prevention and Control (NCIPC) was launched in 1992 to focus specifically on injuries as an important topic for public health. The NCIPC, along with the CDC and NIH, provide research-based evidence and resources to meet goals to reduce injuries.

Table 1.4.1.1 : Year 2020 Intentional and Unintentional Death Rates[2]

Cause of Death	Number of Deaths	Deaths per 100,000 people
Unintentional fall deaths	42,112	12.8
Motor Vehicle traffic deaths	40,698	12.4
Unintentional Poisoning deaths	87,404	26.5
All poisoning deaths	97,034	29.5
Firearm homicides	19,384	5.9
All firearm deaths	45,222	13.7
All homicide deaths	24,576	7.5
Firearm suicides	24,292	7.4
Suffocation suicides	12,495	3.8
Poisoning suicides	5,528	1.7
All suicides	45,979	14.0
All injury deaths	278,345	84.5
All unintentional deaths	200,995	61

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1.4.2: Unintentional Injuries

Unintentional injuries are often referred to as “accidents,” meaning something that was not intended. These include falls, drowning, motor vehicle crashes, fires, and poisoning.

Falls

For adults over 65 years, falls are the leading cause of death due to injury. In 2019 older adult falls caused 34,000 deaths, 3 million visits to the emergency room, and over 800,000 hospitalizations attributing to over $50 billion in medical costs annually. It is estimated that more than one out of four older people fall each year with one out of five falls causing serious injury. Traumatic brain injuries (TBI) and hip fractures are the most common serious injuries. The injuries associated with falls impact a persons quality of life making it hard for a person to get around, do everyday activities, or live on their own. Many people who fall, even if they’re not injured, become afraid of falling. This fear may impact their quality of life by causing a person to cut down on their everyday activities. When a person is less active, they become weaker and this increases their chances of falling.

Fall risk and prevention tips include:

- Lower body weakness, difficulties with walking and balance, or foot pain or poor footwear
  - Do exercises that make your legs stronger and improve your balance. Tai Chi is a good example of this kind of exercise.
  - Ask your doctor or healthcare provider to evaluate your risk for falling and talk with them about specific things you can do.
- Vitamin D deficiency (that is, not enough vitamin D in your system)
  - Ask your doctor or healthcare provider about taking vitamin D supplements.
- Use of medicines, such as tranquilizers, sedatives, or antidepressants. Even some over-the-counter medicines can affect balance and how steady you are on your feet.
  - Ask your doctor or pharmacist to review your medicines to see if any might make you dizzy or sleepy. This should include prescription medicines and over-the counter medicines.
- Vision problems
  - Have your eyes checked by an eye doctor at least once a year, and be sure to update your eyeglasses if needed.
  - If you have bifocal or progressive lenses, you may want to get a pair of glasses with only your distance prescription for outdoor activities, such as walking. Sometimes these types of lenses can make things seem closer or farther away than they really are.
- Home hazards or dangers such as broken or uneven steps, and throw rugs or clutter that can be tripped over.
  - Get rid of things you could trip over.
  - Add grab bars inside and outside your tub or shower and next to the toilet.
  - Put railings on both sides of stairs.
  - Make sure your home has lots of light by adding more or brighter light bulbs.
  - Keep items you use often in cabinets you can reach easily without using a step stool.
  - Use non-slip mats in the bathtub and on shower floors.

Drowning

Drowning is the process of experiencing respiratory impairment from submersion or immersion in liquid. Drowning can happen in seconds and is often silent. It can happen to anyone, any time there is access to water. Not all drownings are fatal, drowning injuries can cause brain damage and other serious outcomes, including long-term disability. Drowning kills nearly 4,000 people each year in the United States and is the leading cause of injury death for children 1 to 4 years of age. For every child who dies from drowning, another eight receive emergency department care for non-fatal drowning. Not all drownings are fatal, drowning injuries can cause brain damage and other serious outcomes, including long-term disability.

Drowning risk and prevention tips include:

- Not being able to swim
  - Adults and children should participate in formal swim lessons.
- Missing or ineffective fences around water
  - A four-sided isolation fence which separates the pool area from the house and yard reduces a child’s risk of drowning by 83% compared to three-sided property-line fencing (which encloses the entire yard, but does not separate the pool from the

house).

- Lack of close supervision
  - Drowning can happen quickly and quietly anywhere there is water, especially to unsupervised children. It happens in lakes and oceans, pools, bathtubs, and even buckets of water. Drowning can occur when lifeguards are present.
  - Use the buddy system! Always swim with another person.
- Location
  - The highest risk locations for drowning vary by age. Among infants under 1 year old, two thirds of all drownings occur in bathtubs. Most drownings happen in home swimming pools among children ages 1-4. More than half of fatal and nonfatal drownings among people 15 years and older occur in natural waters like lakes, rivers, or oceans.
  - It is important to know the risks or natural water, such as ocean rip currents.
- Not wearing life jackets
  - Life jackets can prevent drowning during water activities, especially boating and swimming. The U.S. Coast Guard reported 613 boating-related deaths in 2019, 79% of these deaths were drowning related, and of those who died from drowning 86% were not wearing life jackets.
- Drinking alcohol or using drugs
  - Among adolescents and adults, alcohol use is involved in:
    - up to 70% of deaths associated with water recreation,
    - nearly 1 in 4 emergency department visits for drowning, and
    - about 1 in 5 reported boating deaths.

Motor Vehicle Crashes

In 2021, more than 43,000 people died in motor vehicle crashes in the United States, that is more than 117 people killed in crashes every day. There were over 2.1 million emergency department visits for injuries from motor vehicle crashes in 2020. Deaths from crashes in 2021 resulted in over $430 billion in total costs—including medical costs and cost estimates for lost quality of life and lives lost. Motor vehicle injuries are often associated with distracted, impaired, or inexperienced drivers.

Distracted Drivers

- Distracted driving is doing another activity that takes the driver's attention away from driving that can increase the chance of a motor vehicle crash. There are three main types of distracted driving: visual (taking your eyes off the road), manual (taking your hands off the wheel), and cognitive (taking your mind off driving).
- In 2021, 3,100 people were killed and about 424,000 were injured in crashes involving a distracted driver. Not all persons killed by distracted drivers were in cars, about 1 in 5 were walking, riding their bikes, or otherwise outside a vehicle.
- Prevention: Do not multitask while driving. Whether it's adjusting your mirrors, selecting music, eating, making a phone call, or reading a text or email—do it before or after your trip, not during.

📌 At 55 mph, sending or receiving a text is like driving the length of a football field with your eyes closed.

Child Passenger Safety

- Motor vehicle injuries are a leading cause of death among children in the United States. But many of these deaths can be prevented. Always buckling children in age- and size-appropriate car seats, booster seats, and seat belts reduces serious and fatal injuries by up to 80%.

Seatbelts

- Although most drivers follow these safety measures on every trip, there are still millions who don't. In fact, it is estimated that 2,549 lives (of people 5 years and older) could have been saved in 2017 alone if all motor vehicle occupants were restrained on every trip.

Teen Drivers

- In 2019, almost 2,400 teens in the United States aged 13–19 were killed and about 258,000 were treated in emergency departments for injuries suffered in motor vehicle crashes. That means that every day, about seven teens died due to motor vehicle crashes, and hundreds more were injured. In addition, motor vehicle crash deaths among teens 15–19 years of age resulted in about $4.8 billion in medical and work loss costs for crashes that occurred in 2018.

- Teens who are at especially high risk for motor vehicle crashes are: Males, teens driving with teen or young adult passengers, and newly licensed teens.
- Risk factors include: Inexperience, nighttime and weekend driving, not using a seat belt, distracted driving, speeding, alcohol/drug use

Older drivers

- In 2019, about 8,000 older adults (aged 65+) were killed in traffic crashes, and more than 250,000 were treated in emergency departments for crash injuries. This means that each day, more than 20 older adults are killed and almost 700 are injured in crashes. Drivers aged 70+ have higher crash death rates per mile driven than middle-aged drivers (aged 35-54). Higher crash death rates among this age group are primarily due to increased vulnerability to injury in a crash. Across all age groups, males have substantially higher death rates than females.
- Age-related declines in vision and cognitive functioning (ability to reason and remember), as well as physical changes, might affect some older adults' driving abilities.

Impaired driving

- Every day, 29 people in the United States die in motor vehicle crashes that involve an alcohol-impaired driver, this is one death every 50 minutes. The annual cost of alcohol-related crashes totals more than $44 billion.
- Drugs other than alcohol (legal and illegal) are involved in about 16% of motor vehicle crashes. In 2018, 12.6 million people reported driving under the influence of marijuana or other illicit drugs.
- Drugs other than alcohol (legal and illegal) are involved in about 16% of motor vehicle crashes.

Pedestrian Safety

- More than 7,000 pedestrians were killed on our nation's roads in crashes involving a motor vehicle in 2020. That's about one death every 75 minutes.
- Alcohol, speeding, and location are major risk factors for pedestrian deaths caused by motor vehicles.
- Adults aged 65 years and older accounted for 20% of all pedestrian deaths in 2020, yet were only about 17% of the U.S. population.
- Pedestrian injuries can be reduced by: increasing your visibility, using cross walks, using designated sidewalks/paths, avoiding distractions while walking like headphones, and avoid walking when impaired.

Motorcycle Safety

- More than 5,500 motorcyclists died on our nation's roads in 2020, and more than 180,000 were treated in emergency departments for crash injuries.
- Motorcycle helmets are important to save lives. In 2017, helmets saved an estimated 1,872 lives and an additional 749 more lives could have been saved if all motorcyclists had worn helmets. Motorcycle helmets are 37 percent (for riders) and 41 percent (for passengers) effective in preventing deaths. Helmets reduce the risk of head injury by 69%.

Bicycle Safety

- Bicycle trips make up only 1% of all trips in the United States. However, bicyclists account for over 2% of people who die in a crash involving a motor vehicle on our nation's roads. Nearly 1,000 bicyclists die and over 130,000 are injured in crashes that occur on roads in the United States every year.
- Adults ages 55-69 have the highest bicycle death rates and adolescents, teens, and young adults have the highest rates of bicycle-related injuries treated in emergency departments (EDs).
- Male bicyclists have death rates 6 times higher and injury rates 5 times higher than females.

Fires

Fire is fast, in less than 30 seconds a small flame can turn into a major fire. In 2019, there were 1,291,500 fires which caused 3,704 deaths, 16,600 injuries, and accounts for $14.8 billion.

Home fire safety:

- Smoke alarms
  - Put smoke alarms on every level of your home and inside/outside of all sleeping areas.
  - Test them often to make sure they work and replace them after 10 years.
- In the kitchen

  - Do not leave the room when cooking, if you leave the kitchen turn off the burners.
  - Move flammable objects away from the cooking area.
  - Turn pot handles toward the back of the stove to avoid unintentionally knocking them.
- Home heating
  - Move flammable objects away from fireplaces, wood stoves, space heaters, or radiators.
  - Never use an extension cord with a space heater.
  - Ensure space heaters have an auto turn off if tipped over.
  - Have your chimney inspected.
- Smoking in the house
  - If you smoke in your home you have an increased risk of home fires.
  - Never smoke in bed or when drowsy
  - Ensure all cigarettes are completely put out- use water to ensure!
- Young children and older adults
  - Keep children away for anything that gets hot.
  - Keep matches and lighters out of reach of children.
  - Teach children how to escape the home if you cannot help them in the event of a home fire.
  - Older adults may need assistance to escape a home fire.

Poisoning

Poisoning is one of the top three causes of fatal unintentional injuries. In response to public health concerns regarding poisoning, in 1980 the National Capital Poison Center (NCPC) was founded, which is an independent, not-for-profit 501(c)(3) organization. There are 2 ways to get help from Poison Control: online at webPOISONCONTROL® or by phone at 1-800-222-1222.

As the primary organization providing help with poisoning, the NCPC data provides a picture of the commonality of injuries associated with poisoning. In 2020, the 55 U.S. poison control centers provided telephone guidance for over 2.1 million human poison exposures, which included:

- 6.4 poison exposures/1000 population,
- 37.9 poison exposures in children younger than 6 years/1000 children,
- 1 poison exposure reported to U.S. poison control centers every 15 seconds.
- In 2020, adults comprised almost half of all exposures (47%), followed by children younger than 6 (39%), then teens (8%).

Common types of poisoning include food poisoning, poisonous plants, and carbon monoxide poisoning.

Food poisoning symptoms can be anywhere from mild to very serious and may include: Upset stomach, stomach, cramps, nausea, vomiting, diarrhea, and fever. Some foods are more associated with foodborne illnesses and food poisoning than others, such as raw animal foods. While certain foods are more likely to make you sick, any food can get contaminated in the field, during processing, or during other stages in the food production chain, including through cross-contamination with raw meat in kitchens.

Many native and exotic plants are poisonous to humans when ingested or if there is skin contact with plant chemicals. However, the most common problems with poisonous plants arise from contact with the sap oil of several native plants that cause an allergic skin reaction—poison ivy, poison oak, and poison sumac.

Everyone is at risk for Carbon monoxide (CO) poisoning. CO, an odorless, colorless gas, that can cause sudden illness and death. CO is found in fumes produced any time you burn fuel in cars or trucks, small engines, stoves, lanterns, grills, fireplaces, gas ranges, or furnaces. CO can build up indoors and poison people and animals who breathe it. The most common symptoms of CO poisoning are headache, dizziness, weakness, upset stomach, vomiting, chest pain, and confusion. CO symptoms are often described as “flu-like.” If you breathe in a lot of CO it can make you pass out or kill you. People who are sleeping or drunk can die from CO poisoning before they have symptoms. It is important to use Carbon Monoxide detectors to know if CO is present.

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1.4.3: Intentional Injuries - Violence

There are many forms of intentional injury, or violence. The CDC approaches violence using the “Social-Ecological Model: a Framework for Prevention”. The framework encourages viewing violence and violence prevention as a multifaceted interconnected dynamic including the individual, their relationships, their community, and our society.

- The Individual
  - Individuals factors such as age, education, income, substance use, or history of abuse impact the risk of violence. A focus on attitudes, beliefs, behaviors, along with training on conflict resolution, safe dating, and healthy relationship may positively impact their risk of violence.
- Relationships
  - A person’s closest social circle-peers, partners and family members-influences their behavior and contribute to their experience. Parenting, mentors, effective communication, and problem solving may support effective relationships to prevent violence.
- Community
  - Where a person lives, works, or goes to school can impact their risk of violence. Creating safe physical and social environments may reduce violence in the community.
- Societal
  - A focus on society asks us to understand and look at how our society either encourages or inhibits violence, for example how social or cultural norms use violence to resolve conflicts or how wealth and health inequalities impact violence risk.

Community Violence

Community violence is interpersonal violence generally outside the home that is perpetrated by individuals who are not intimately related to the victim and who may or may not know each other. Examples include assaults, homicides, fights among groups, and shootings in public places, such as schools and on the streets. Acts of community violence include but are not limited to riots, sniper attacks, gang wars, drive-by shootings, bullying, workplace assaults, terrorist attacks, torture, bombings, war, ethnic cleansing, and widespread sexual, physical, and emotional abuse.

Young people are disproportionately impacted by violence in their communities, including firearm injuries and deaths. Violence is a leading cause of death and nonfatal injuries among adolescents and young adults; over half of US homicides in 2019 occurred among those ages 15 to 34. Unfortunately, data show significant increases in homicide rates in 2020 compared to 2019.

People’s health outcomes are influenced by the conditions in which they live, work, play, and learn. These conditions are called social determinants of health. Systemic racism, bias, and discrimination; economic instability; concentrated poverty; and limited housing, education, and healthcare access drive health inequities, such as violence. Communities of color often disproportionately experience these negative conditions, placing residents at greater risk for poor health outcomes. For example, Black or African American, American Indian, and Alaskan Native, and Hispanic or Latino persons have higher homicide rates than other racial and ethnic demographic groups. Research indicates that youth and young adults (ages 10-34), particularly those in communities of color, are disproportionately impacted.

Community violence can cause significant physical injuries and mental health conditions such as depression, anxiety, and post-traumatic stress disorder (PTSD). Living in a community experiencing violence is also associated with increases in risk of developing chronic diseases, as concerns about violence may prevent someone from engaging in healthy behaviors, such as walking, bicycling, using parks and recreational spaces, and accessing healthy food outlets. Violence scares people out of participating in neighborhood activities; limits business growth and prosperity; strains education, justice, and medical systems; and slows community progress.

The Division of Violence Prevention (DVP) at the Centers for Disease Control and Prevention (CDC) is focused on preventing community violence by identifying and implementing science-based programs, policies, and practices with partners and communities to disseminate, implement, and scale-up strategies based on the best available evidence to create safer communities, such as:

- Changing social norms through street outreach/violence interruption programs.
- Changing the physical environment through Crime Prevention Through Environmental Design (CPTED).

- Preventing future risk and lessening the harms of violence exposure through hospital-community partnerships, and treatment services such as Trauma-Focused Cognitive Behavior Therapy ®(TF-CBT) and Multisystemic Therapy® (MST).
- Strengthening economic supports through job training and summer jobs programs.
- Strengthening youth's skills through universal school-based programs to help youth develop skills to prevent violence and engage in healthy behaviors.
- Connecting youth to caring adults and activities such as mentoring and after-school programs.

Intimate and Partner Violence

Intimate partner violence (IPV) is abuse or aggression that occurs in a romantic relationship. "Intimate partner" refers to both current and former spouses and dating partners. **IPV is common.** It affects millions of people in the United States each year and often starts early and continues throughout life. When IPV occurs in adolescence, it is called teen dating violence (TDV). About 1 in 4 women and nearly 1 in 10 men have experienced contact sexual violence, physical violence, and/or stalking by an intimate partner during their lifetime and reported some form of IPV-related impact. About 11 million women and 5 million men who reported experiencing contact sexual violence, physical violence, or stalking by an intimate partner in their lifetime said that they first experienced these forms of violence before the age of 18. Youth from groups that have been marginalized, such as sexual and gender minority youth, are at greater risk of experiencing sexual and physical dating violence.

IPV can vary in how often it happens and how severe it is and might include:

- **Physical violence** is when a person hurts or tries to hurt a partner by hitting, kicking, or using another type of physical force.
- **Sexual violence** is forcing or attempting to force a partner to take part in a sex act, sexual touching, or a non-physical sexual event (e.g., sexting) when the partner does not or cannot consent.
- **Stalking** is a pattern of repeated, unwanted attention and contact by a partner that causes fear or concern for one's own safety or the safety of someone close to the victim.
- **Psychological aggression** is the use of verbal and non-verbal communication with the intent to harm another partner mentally or emotionally and/or to exert control over another partner.

IPV Prevention includes:

Teach safe and healthy relationship skills

- Social-emotional learning programs for youth
- Healthy relationship programs for couples

Engage influential adults and peers

- Men and boys as allies in prevention
- Bystander empowerment and education
- Family-based programs

Disrupt the developmental pathways toward partner violence

- Early childhood home visitation
- Preschool enrichment with family engagement
- Parenting skill and family relationship programs
- Treatment for at-risk children, youth and families

Create protective environments

- Improve school climate and safety
- Improve organizational policies and workplace climate
- Modify the physical and social environments of neighborhoods

Strengthen economic supports for families

- Strengthen household financial security
- Strengthen work-family supports

Support survivors to increase safety and lessen harms

- Victim-centered services
- Housing programs

- First responder and civil legal protections
- Patient-centered approaches
- Treatment and support for survivors of IPV, including TDV
- Workplace Injuries

Sexual Violence

Sexual violence is sexual activity when consent is not obtained or freely given. It is a serious public health problem in the United States that affects millions of people each year in the United States and profoundly impacts lifelong health, opportunity, and well-being. Researchers know the numbers underestimate this problem because many cases are unreported. Victims may be ashamed, embarrassed, or afraid to tell the police, friends, or family about the violence. Victims may also keep quiet because they have been threatened with further harm if they tell anyone or do not think anyone will help them.

Sexual violence impacts every community and affects people of all genders, sexual orientations, and ages. Anyone can experience or perpetrate sexual violence. The perpetrator of sexual violence is usually someone the victim knows, such as a friend, current or former intimate partner, coworker, neighbor, or family member. Sexual violence can occur in person, online, or through technology, such as posting or sharing sexual pictures of someone without their consent, or non-consensual sexting.

The data shows:

- **Sexual violence is common.** More than 1 in 3 women and 1 in 4 men have experienced sexual violence involving physical contact during their lifetimes. Nearly 1 in 5 women and 1 in 38 men have experienced completed or attempted rape, and 1 in 14 men was made to penetrate someone (completed or attempted) during his lifetime.
- **Sexual violence starts early.** One in 3 female rape victims experienced it for the first time between 11-17 years old and 1 in 8 reported that it occurred before age 10. Nearly 1 in 4 male rape victims experienced it for the first time between 11-17 years old and about 1 in 4 reported that it occurred before age 10.
- **Sexual violence is costly.** Recent estimates put the lifetime cost of rape at $122,461 per victim, including medical costs, lost productivity, criminal justice activities, and other costs.

Sexual Violence Prevention includes:

Promote Social Norms that Protect Against Violence

- Bystander approaches
- Mobilizing men and boys as allies

Teach Skills to Prevent Sexual Violence

- Social-emotional learning
- Teaching healthy, safe dating and intimate relationship skills to adolescents
- Promoting healthy sexuality
- Empowerment-based training

Provide Opportunities to Empower and Support Girls and Women

- Strengthening economic supports for women and families
- Strengthening leadership and opportunities for girls

Create Protective Environments

- Improving safety and monitoring in schools
- Establishing and consistently applying workplace policies
- Addressing community-level risks through environmental approaches

Support Victims/Survivors to Lessen Harms

- Victim-centered services
- Treatment for victims of SV
- Treatment for at-risk children and families to prevent problem behavior including sex offending

Firearm Violence

A firearm injury is a gunshot wound or penetrating injury from a weapon that uses a powder charge to fire a projectile. Weapons that use a power charge include handguns, rifles, and shotguns. Injuries from air- and gas-powered guns, BB guns, and pellet guns are not considered firearm injuries as these types of guns do not use a powder charge to fire a projectile.

Firearm violence is a serious public health problem that impacts the health and safety of Americans. Important gaps remain in our knowledge about the problem and ways to prevent it. Addressing these gaps is an important step toward keeping individuals, families, schools, and communities safe from firearm violence and its consequences.

Firearm injuries are a serious public health problem. In 2020, there were 45,222 firearm-related deaths in the United States, that's about 124 people dying from a firearm-related injury each day. More than half of firearm related deaths were suicides and more than 4 out of every 10 were firearm homicides.

More people suffer nonfatal firearm-related injuries than die. More than seven out of every 10 medically treated firearm injuries are from firearm-related assaults. Nearly 2 out of every 10 are from unintentional firearm injuries. There are few intentionally self-inflicted firearm-related injuries seen in hospital emergency departments. Most people who use a firearm in a suicide attempt, die from their injury.

Firearm injuries affect people in all stages of life. In 2020, firearm-related injuries were among the 5 leading causes of death for people ages 1-44 in the United States.

Some groups have higher rates of firearm injury than others. Men account for 86% of all victims of firearm death and 87% of nonfatal firearm injuries. Rates of firearm violence also vary by age and race/ethnicity. Firearm homicide rates are highest among teens and young adults 15-34 years of age and among Black or African American, American Indian or Alaska Native, and Hispanic or Latino populations. Firearm suicide rates are highest among adults 75 years of age and older and among American Indian or Alaska Native and non-Hispanic white populations.

There are many types of firearm injuries, which can be fatal or nonfatal:

- **Intentionally self-inflicted**
  - Includes firearm suicide or nonfatal self-harm injury from a firearm
- **Unintentional**
  - Includes fatal or nonfatal firearm injuries that happen while someone is cleaning or playing with a firearm or other incidents of an accidental firing without evidence of intentional harm
- **Interpersonal violence**
  - Includes firearm homicide or nonfatal assault injury from a firearm
- **Legal intervention**
  - Includes firearm injuries inflicted by the police or other law enforcement agents acting in the line of duty
    - For example, firearm injuries that occur while arresting or attempting to arrest someone, maintaining order, or ensuring safety
  - The term *legal intervention* is a commonly used external cause of injury classification. It does not indicate the legality of the circumstances surrounding the death.
- **Undetermined intent**
  - Includes firearm injuries where there is not enough information to determine whether the injury was intentionally self-inflicted, unintentional, the result of legal intervention, or from an act of interpersonal violence.

It is important to store all firearms safely when not in use. Putting a firearm out of sight or out of reach is **not safe storage and not enough** to prevent use by children or unauthorized adults.

Drug Overdose

Drug overdoses are now the leading cause of injury deaths in the United States, and most overdoses involve opioids. More than 932,000 people have died since 1999 from a drug overdose. In 2020, 91,799 drug overdose deaths occurred in the United States. The age-adjusted rate of overdose deaths increased by 31% from 2019 (21.6 per 100,000) to 2020 (28.3 per 100,000). Opioids, mainly synthetic opioids (other than methadone), are currently the main driver of drug overdose deaths. 82.3% of opioid-involved overdose deaths involved synthetic opioids. Research shows that people who have had at least one overdose are more likely to have

another. In 2020, an **estimated 41.1 million Americans** needed substance use disorder treatment, but **only 2.6 million people** with a substance use disorder in the past year received treatment.

Prevention Startegies include:

- **Increase and maximize** use of prescription drug monitoring programs, which are state-run databases that track prescriptions for controlled substances and can help improve opioid prescribing, inform clinical practice, and protect those at risk.
- **Learn** about the risks of prescription opioids and about the help and resources that are available for someone who may be struggling with opioid use disorder.
- **Treat opioid use disorder** by increasing access to substance use disorder treatment services, including Medication-Assisted Treatment (MAT) and Medications for Opioid Use Disorder (MOUD).
- **Reverse overdose** by expanding access to naloxone, a drug used to reverse overdose, for community members (family members and neighbors) and service providers (i.e., first responders).

Child Abuse and Neglect

Child abuse and neglect are serious public health problems that can have long-term impact on health, opportunity, and wellbeing. At least 1 in 7 children have experienced child abuse or neglect in the past year in the United States. however this is likely an underestimate because many cases are unreported. In 2020, 1,750 children died of abuse and neglect in the United States. Experiencing poverty can place a lot of stress on families, which may increase the risk for child abuse and neglect. Rates of child abuse and neglect are 5 times higher for children in families with low socioeconomic status. In the United States, the total lifetime economic burden associated with child abuse and neglect was about $592 billion in 2018. This economic burden rivals the cost of other high-profile public health problems, such as heart disease and diabetes.

This issue includes all types of abuse and neglect of a child under the age of 18 by a parent, caregiver, or another person in a custodial role (such as a religious leader, a coach, a teacher) that results in harm, the potential for harm, or threat of harm to a child. There are four common types of abuse and neglect:

- **Physical abuse** is the intentional use of physical force that can result in physical injury. Examples include hitting, kicking, shaking, burning, or other shows of force against a child.
- **Sexual abuse** involves pressuring or forcing a child to engage in sexual acts. It includes behaviors such as fondling, penetration, and exposing a child to other sexual activities.
- **Emotional abuse** refers to behaviors that harm a child's self-worth or emotional well-being. Examples include name-calling, shaming, rejecting, withholding love, and threatening.
- **Neglect** is the failure to meet a child's basic physical and emotional needs. These needs include housing, food, clothing, education, access to medical care, and having feelings validated and appropriately responded to.

Risk Factors for Victimization include

Individual Risk Factors

- Children younger than 4 years of age
- Children with special needs that may increase caregiver burden (e.g., disabilities, mental health issues, and chronic physical illnesses)

Risk Factors for Perpetration

- Caregivers with drug or alcohol issues
- Caregivers with mental health issues, including depression
- Caregivers who don't understand children's needs or development
- Caregivers who were abused or neglected as children
- Caregivers who are young or single parents or parents with many children
- Caregivers with low education or income
- Caregivers experiencing high levels of parenting stress or economic stress
- Caregivers who use spanking and other forms of corporal punishment for discipline
- Caregivers in the home who are not a biological parent
- Caregivers with attitudes accepting of or justifying violence or aggression

Family Risk Factors

- Families that have household members in jail or prison
- Families that are isolated from and not connected to other people (extended family, friends, neighbors)
- Families experiencing other types of violence, including relationship violence
- Families with high conflict and negative communication styles

Community Risk Factors

- Communities with high rates of violence and crime
- Communities with high rates of poverty and limited educational and economic opportunities
- Communities with high unemployment rates
- Communities with easy access to drugs and alcohol
- Communities where neighbors don’t know or look out for each other and there is low community involvement among res
- dents
- Communities with few community activities for young people
- Communities with unstable housing and where residents move frequently
- Communities where families frequently experience food insecurity

Prevention Strategies include:

Strengthen economic supports to families

- Strengthening household financial security
- Family-friendly work policies

Change social norms to support parents and positive parenting

- Public engagement and education campaigns
- Legislative approaches to reduce corporal punishment

Provide quality care and education early in life

- Preschool enrichment with family engagement
- Improved quality of child care through licensing and accreditation

Enhance parenting skills to promote healthy child development

- Early childhood home visitation
- Parenting skill and family relationship approaches

Intervene to lessen harms and prevent future risk

- Enhanced primary care
- Behavioral parent training programs
- Treatment to lessen harms of abuse and neglect exposure
- Treatment to prevent problem behavior and later involvement in violence

Suicide

Suicide is death caused by injuring oneself with the intent to die. A suicide attempt is when someone harms themselves with any intent to end their life, but they do not die as a result of their actions.

Suicide rates increased 30% between 2000–2018, and declined in 2019 and 2020. Even with the decline in 2020, Suicide was still a leading cause of death in the United States, with nearly 46,000 deaths in 2020. This is about one death every 11 minutes. In 2020, suicide was among the top 9 leading causes of death for people ages 10-64 and was the second leading cause of death for people ages 10-14 and 25-34. The number of people who think about or attempt suicide is even higher. In 2020, an estimated 12.2 million American adults seriously thought about suicide, 3.2 million planned a suicide attempt, and 1.2 million attempted suicide.

Americans with higher than average rates of suicide are veterans, people who live in rural areas, and workers in certain industries and occupations like mining and construction. Young people who identify as lesbian, gay, or bisexual have higher rates of suicidal thoughts and behavior compared to their peers who identify as heterosexual. People who have experienced violence, including child abuse, bullying, or sexual violence have a higher suicide risk.

Suicide and suicide attempts cause serious emotional, physical, and economic impacts. People who attempt suicide and survive may experience serious injuries that can have long-term effects on their health. They may also experience depression and other mental health concerns. The good news is that more than 90% of people who attempt suicide and survive never go on to die by suicide.

Suicide and suicide attempts affect the health and well-being of friends, loved ones, co-workers, and the community. When people die by suicide, their surviving family and friends may experience shock, anger, guilt, symptoms of depression or anxiety, and may even experience thoughts of suicide themselves.

Being connected to family and community support and having easy access to health care can decrease suicidal thoughts and behaviors.

Suicide Prevention strategies include:

- Strengthen economic supports
  - Strengthen household financial security
  - Housing stabilization policies
- Strengthen access and delivery of suicide care
  - Coverage of mental health conditions in health insurance policies
  - Reduce provider shortages in underserved areas
  - Safer suicide care through systems change
- Create protective environments
  - Reduce access to lethal means among persons at risk of suicide
  - Organizational policies and culture
  - Community-based policies to reduce excessive alcohol use
- Promote connectedness
  - Peer norm programs
  - Community engagement activities
- Teach coping and problem-solving skills
  - Social-emotional learning programs
  - Parenting skill and family relationship programs
- Identify and support people at risk
  - Gatekeeper training
  - Crisis intervention
  - Treatment for people at risk of suicide
  - Treatment to prevent re-attempts
- Lessen harms and prevent future risk
  - Postvention
  - Safe reporting and messaging about suicide

Need help? Know someone who does?

Contact the National Suicide Prevention Lifeline

- Call 1-800-273-TALK (1-800-273-8255)
- Use the online Lifeline Crisis Chatexternal icon

Both are free and confidential. You'll be connected to a skilled, trained counselor in your area.

For more information, visit the National Suicide Prevention Lifelineexternal icon.

You can also connect 24/7 to a crisis counselor by texting the Crisis Text Line.external icon Text HOME to 741741.

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1.4.4: End-of-Chapter Material

Key takeaways for this Chapter

- Unintentional injuries have routinely been ranked 3rd-4th for overall causes death.
- For people ages 5-29, three of the top five causes of death are injury-related
- Common unintentional injuries result from falls, drowning, motor vehicle crashes, fires, and poisoning.
- Common intentional injuries results from community violence, intimate partner violence, sexual violence, firearm violence, drug overdoses, child abuse/neglect, and suicide.
- Understanding how injuries occur can help you to make safer choices for yourself and help others who may need assistance.

Reference

1. National Center for Health Statistics. Health, United States, 2019: Table 005. Hyattsville, MD. 2021. Available from: https://www.cdc.gov/nchs/hus/contents2019.htm. [1]
2. Suggested Citation: Centers for Disease Control and Prevention, National Center for Health Statistics. National Vital Statistics System, Mortality 1999-2020 on CDC WONDER Online Database, released in 2021. Data are from the Multiple Cause of Death Files, 1999-2020, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Jun 7, 2022 6:31:25 PM [2]

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1.4.5: Preventing Violence and Injury- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

5 dangerous things you should let your kids do



My son was a Columbine shooter. This is my story



The beauty of human skin in every color



The difference between being “not racist” and antiracist



The multibillion-dollar US prison industry — and how to dismantle it



The shadow pandemic of domestic violence during COVID-19



What if mental health workers responded to emergency calls?



What happens when you have a concussion?



The neuroscience of restorative justice



The surprising connection between brain injuries and crime



Why children stay silent following sexual violence



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SECTION OVERVIEW

1.5: Relationships, Sexuality, and Contraception

Learning Objectives

By the end of this chapter you will be able to:

- Compare signs of health and unhealthy relationships
- Define the many types of loving relationships.
- Employ effective communication techniques.
- Describe the difference between sex, gender, and sexuality
- Choose the best type of contraceptive method based on effectiveness against unintended pregnancy and STD transmission.

How does social health impact overall health?

What does it mean to love?

How can I know whether my relationship is healthy or unhealthy?

What can I do to be en effective communicator?

What type of birth control is best for me?

1.5.1: Relationships and Communication

1.5.2: Ending and Coping with Failed Relationships

1.5.3: Sex, Gender, and Sexuality

1.5.4: Pregnancy

1.5.5: Contraception and Abortion

1.5.6: End-of-Chapter Material

1.5.7: Relationships, Sexuality, and Contraception- Optional Continued Learning

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1.5.1: Relationships and Communication

Social wellness is just one of the dimensions of wellness that impact our overall health and well-being. Maintaining healthy relationships, enjoying being with others, developing friendships and intimate relations, caring about others, letting others care about you, and contributing to your community are all important aspects of developing your social wellness. A meta-analysis of 148 studies indicated that people with adequate social relationships had a reduction in risk of mortality comparable to quitting smoking[1] and social relationships have also been shown to prevent and even cure some diseases[2], thus it is well documented that strong social relationships extend life and improve health.

Types of Relationships and Love

It is challenging to define what love is and the varying types of love and relationships we have throughout our life. A Psychologist named Robert Sternberg has spent is career researching love and developing theories that help increase our understanding of love and relationships.

Triangular Theory of Love

In the 1980's, Sternberg developed the Triangular Theory of Love[3] which describes different types of love and relationships based on a combination of three components (ingredients): passion, intimacy, and commitment. Years later Sternberg developed the Theory of Love as a Story, which focuses on how a persons beliefs and conceptions about relationships impact the type and success of their relationships. Most recently, Sternberg has blended the two theories into one theory now known as Sternberg's Love-Match Theory.

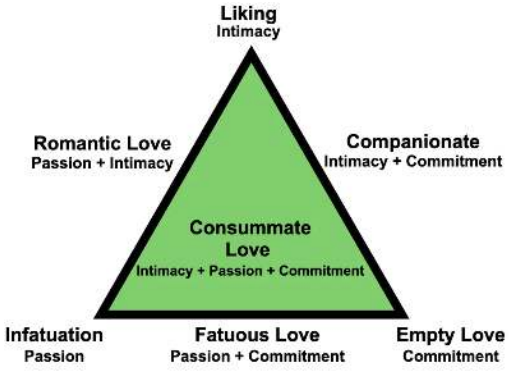


Figure 1.5.1.1 *: The Triangular Theory of Love*

Sternberg uses intimacy, passion, and commitment to describe different types of love, with each type of love including varying degrees of intimacy, passion, and commitment. The goal for a long term happy relationship is to have a high level of all three components.

- **Intimacy** refers to feelings of closeness, connectedness, and bondedness. Feeling warmth, feeling comfortable to be open an honest, feeling that you are valued and safe, and feeling that you can count on the person.
- **Passion** typically refers to the drives that lead to romance, physical attraction, or sexual fulfillment. However, passion can also refer to intense feelings of care, such as not being able to live without the person, which could be a passionate need to ensure someone is safe and healthy, like a child or family member.
- **Commitment** is not a feeling, but rather a decision you choose to make throughout your relationship. It is the decision to love a certain person, and in the long-term, to one's commitment to maintain that love.

Table 1.5.1.1 : Types of Love and Relationships Based on Levels of Intimacy, Passion, and Commitment

Type of Love	Intimacy	Passion	Commitment
Non-Love	No	No	No
Friendship	Yes	No	No
Infatuation	No	Yes	No
Empty Love	No	No	Yes

Type of Love	Intimacy	Passion	Commitment
Romantic Love	Yes	Yes	No
Companionate Love	Yes	No	Yes
Fatuous Love	No	Yes	Yes
Consummate Love	Yes	Yes	Yes

The Triangular Theory of Love can be helpful for evaluating relationships by understanding how love changes based on varying levels of intimacy, passion, and commitment. Couples can better understand their love and avoid challenges in their relationship by working on the areas that need improvement. For example, a married couple who once had high levels of intimacy, passion, and commitment might find that their level of passion has lowered over the years and may choose to focus on bringing passion back to their relationship to support their love. Or, a couple who has romantic love with high levels of intimacy and passion may make the decision to be committed to one another and reach full consummate love.

✔ Reflection: Types of love in your life

Review the types of love in Table 10.1. Identify people in your life or in your past who you would associate with each type of love.

Think about a relationship you've been in…

- How has the type of love changed over time?
- How might you use the varying levels of passion, intimacy, and commitment to identify areas of a relationship that may need work?

Theory of Love as a Story

Although the Triangular Theory of Love provides a helpful structure for understanding varying types of love, it does not account for a persons belief in what love is or should be. Sternberg's Theory of Love as a Story focuses on recognizing and understanding a persons "love story" and how that story impacts their relationships. By understanding our story and the story of potential partners we can better understand the expectations for the relationship.

A persons love story is unconsciously developed throughout their life by the relationships they see in real life as well as through media. Your love story helps to explain what you are seeking in loving relationships and how that relationship fulfills your needs and wants. Although there are infinite story possibilities, based on years of research Sternberg identified 26 types of love stories including the garden story, business story, sewing story, horror story, sacrifice story, art story, and game story [4][5].

Each type of story describes the relationship dynamics that are commonly at play. For example, those with a Business Story of relationships view the relationship as a business proposition or transaction and are looking for a business partner who will keep life organizes and focused on important things like the economy, money, and social status. However, persons with a Garden Story of relationships view the relationship as something that will is successful as long as you take care of it and nurture it to grow strong, so for these persons it is important to take care of each other and take care of their relationship.

Research indicates that similar or complementary love stories lead to more successful relationships; Similar love stories mean each person is bringing similar expectations to the relationship. With this understanding, it may be helpful to more fully understand your own love story and also to recognize and understand the love story of your partner. Once we recognize and understand our own love story, we can begin to ask ourselves if we like the story, if the story has been working for us, or if we would like to change our story.

✔ Challenge: Love stories and movies

Sternberg describes 26 types of love stories and explains that we see these love stories in various media throughout our lives.

- Review the 26 types of love stories and try to associate a type of love story with a relationship as depicted in a movie you've watched or a book you've read.
  - In what ways were you able to identify the type of love story each person brought to the relationship?

- Did both people in the relationship bring a similar love story to the relationship?
- Were you able to identify relationships where two people brought different love stories, or expectations, to the relationship? Did it cause a conflict?

Healthy vs. Unhealthy Relationships

We know relationships are important to our health and well-being, however not all relationships are good for us. It is important to understand the signs and characteristics of healthy and unhealthy relationships.

In a healthy relationships, the couples believe in non-violent conflict resolution, where they can talking honestly, can agree to disagree, and make decisions and compromises together. They communicate effectively ensuring they are listening to each other without judgement and communicate respectfully showing each person is valued and loved. They recognize that each person is a unique individual and respect their right to autonomy to able to enjoy time apart with friends and activities they enjoy. Their relationship is based on trust which allows them to feel comfortable being themselves and feel unconditionally supported. Lastly, they have fun together and have more good times than bad.

Unhealthy relationships might include a focus on only one person while disregarding the other. One or both of the people in the relationship might drop friends and family or activities they enjoy. They might feel pressured or controlled in the relationship or often feeling sad, scared, or lonely when together. When a relationship has more bad times than good times, this can be a sign that the relationship is unhealthy.

Table 1.5.1.2 : Characteristics of Healthy and Unhealthy Relationships[6]

Healthy Relationships	Unhealthy Relationships

Healthy Relationships	Unhealthy Relationships
• **Mutual respect.** Respect means that each person values who the other is and understands the other person's boundaries. • **Trust**. Partners should place trust in each other and give each other the benefit of the doubt. • **Honesty.** Honesty builds trust and strengthens the relationship. • **Compromise.** In a dating relationship, each partner does not always get his or her way. Each should acknowledge different points of view and be willing to give and take. • **Individuality**. Neither partner should have to compromise who he/she is, and his/her identity should not be based on a partner's. Each should continue seeing his or her friends and doing the things he/she loves. Each should be supportive of his/her partner wanting to pursue new hobbies or make new friends. • **Good communication.** Each partner should speak honestly and openly to avoid miscommunication. If one person needs to sort out his or her feelings first, the other partner should respect those wishes and wait until he or she is ready to talk. • **Anger control.** We all get angry, but how we express it can affect our relationships with others. Anger can be handled in healthy ways such as taking a deep breath, counting to ten, or talking it out. • **Fighting fair.** Everyone argues at some point, but those who are fair, stick to the subject, and avoid insults are more likely to come up with a possible solution. Partners should take a short break away from each other if the discussion gets too heated. • **Problem solving**. Dating partners can learn to solve problems and identify new solutions by breaking a problem into small parts or by talking through the situation. • **Understanding.** Each partner should take time to understand what the other might be feeling. • **Self-confidence.** When dating partners have confidence in themselves, it can help their relationships with others. It shows that they are calm and comfortable enough to allow others to express their opinions without forcing their own opinions on them. • **Being a role model.** By embodying what respect means, partners can inspire each other, friends, and family to also behave in a respectful way. • **Healthy sexual relationship.** Dating partners engage in a sexual relationship that both are comfortable with, and neither partner feels pressured or forced to engage in sexual activity that is outside his or her comfort zone or without consent.	• **Control.** One dating partner makes all the decisions and tells the other what to do, what to wear, or who to spend time with. He or she is unreasonably jealous, and/or tries to isolate the other partner from his or her friends and family. • **Hostility.** One dating partner picks a fight with or antagonizes the other dating partner. This may lead to one dating partner changing his or her behavior in order to avoid upsetting the other. • **Dishonesty.** One dating partner lies to or keeps information from the other. One dating partner steals from the other. • **Disrespect.** One dating partner makes fun of the opinions and interests of the other partner or destroys something that belongs to the partner. • **Dependence**. One dating partner feels that he or she "cannot live without" the other. He or she may threaten to do something drastic if the relationship ends. • **Intimidation.** One dating partner tries to control aspects of the other's life by making the other partner fearful or timid. One dating partner may attempt to keep his or her partner from friends and family or threaten violence or a break-up. • **Physical violence.** One partner uses force to get his or her way (such as hitting, slapping, grabbing, or shoving). • **Sexual violence**. One dating partner pressures or forces the other into sexual activity against his or her will or without consent.

Communication

Being able to effectively communicate is an important skill for successful relationships.

Three keys to Effective Communication are:

1. Be an active listener

- Actively listening means listening without judging and with an openness to want to understand what you are hearing.

2. Communicate clearly
   - When developing either written or verbal communication it is important to take into consideration your audience, their cultures, and their experiences. Communication takes many skills, it is not just about listening and speaking, but also takes into consideration your thoughts and feelings throughout the exchange and how the setting or type of communication impacts the message. When communicating verbally or through written text it is important to ensure your communication is clear and not too complex or lengthy.
3. Understand body language
   - Non-verbal clues play a large role in the communication process. Non-verbal feedback may be positive such as nodding the head, maintaining eye contact, and leaning in. Non-verbal feedback can also seem to show you are uninterested, such as looking away, turning the body away, or rolling eyes.

"I" Statements vs. "You" Statements

"I" statements can help you focus on and be clear about your own thoughts and feelings, and what it is that you want or need. They may also involve an acknowledgement of the thoughts/feelings/goals of the other person.

The real focus in "I" statements is on the "I feel," "I want," or "I think" part of the statement. Identifying your thoughts, feelings, needs, and wants related to a situation will help you to avoid blaming someone else or getting caught up in the emotion of the moment.

"You" statements, on the other hand, tend to place blame or criticize the other person. This typically puts the other person on the defensive, and does not encourage open communication.

For example, saying "I feel worried when you are running late to meet me for dinner and don't call to let me know" (I statement) vs. "You are always running late, and never bother to let me know" (You statement) will likely result in two very different reactions and conversations! The first statement simply expresses how the person is feeling, whereas the second statement sets a critical and accusatory tone.

Be Assertive

Assertiveness is an honest and appropriate expression of your feelings, thoughts, wants and needs. Acting in an assertive way helps you to stand up for your rights in a respectful manner. It is a way to communicate what you believe, what you want and need, and what is important to you. Assertiveness can sometimes be compared to, or confused with, being aggressive, however aggressive behavior often means standing up for yourself in ways that violate the rights of others and can be demanding, hostile, and blaming.

People often associate the concept of assertiveness with standing up for your rights when you feel that someone has taken advantage of you in a negative way. However, it is also important to recognize that being more assertive can help you to communicate in a positive way in your relationships, which helps to promote mutual respect. Non-Assertive behavior is often submissive, inhibited, passive, and self-denying.

Assertiveness can help you:

- speak up when you have a question or concern,
- say "no" when you don't want to do something, and
- express thoughts or feelings

Communicating assertively does not guarantee that you will get what you want or need. However, you will have the satisfaction of expressing yourself in a positive, self-advocating way. You will probably feel better about yourself and your communication with others. And, you will increase the probability of getting what you need or want, while also respecting the wants or needs of others.

What keeps people from speaking up in an assertive way?

- Not being clear about what they want and need
- Fear of displeasing others and of not being liked
- Not believing they have the right to be assertive
- Lacking the skills to effectively express themselves

To become more skilled in communicating assertively it is important to practice. You won't learn how to become a more assertive person just by reading one book or attending one workshop. You can practice with your friends and family. Let them know what

you are doing first! Ask for help/feedback on how you're doing.

- Start Gradually
  - In the beginning, don't try changing your behavior in the most complex or difficult situations. Practice first in the least risky ones.
  - Some examples of starting gradually include:
    - Returning a purchased item (that you are not satisfied with) to a store for a refund
    - Asking your partner/roommate/kids to help empty the dishwasher or take out the garbage
    - Suggesting a movie that you would like to watch for an upcoming movie night
  - If you start small to enhance your chances of success, you will experience how it feels to express yourself assertively and it will be easier to move onto more challenging situations.
- Keep in mind that no one can read your mind– focus on expressing and communicating what is important to you.

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1.5.2: Ending and Coping with Failed Relationships

When and Why Relationships End

Relationships end for many reasons including personality conflicts, geographical separation, financial concerns, career problems, and differences in expectations. Failure to communicate what you want/need and ensuring that your partner is in agreement may contribute to the demise of a relationship. Under stress, communication and cooperation between partners can breakdown. Conflict, lack of respect, and negative interactions can erode even good relationships.

On the basis of 35 years of research and couples therapy, John Gottman identified four behavior patterns that predict divorce with 90% accuracy:

- Criticism. Phrasing complaints in terms of a partner's defect (e.g., You always talk about yourself. You are so self-obsessed.")
- Defensiveness. Indignation as a form of self-protection (e.g., "It's not my fault we are out of milk. You used the last of it.")
- Stonewalling. Withdrawing emotionally from an interaction (e.g., ignoring the other person)
- Contempt. Talking down to the other person (e.g., "Why are you so stupid?")

Of these four, contempt is the biggest predictor of divorce.

Coping with Failed Relationships

Uncoupling can be very painful. If you find yourself part of a failed relationship, consider:

- Acknowledge that you have gone through a rough experience. Seek trusted friends, and if needed, a professional help.
- Let go of negative thought patterns and habits. Engage in habits that make you happy.
- Make a promise to yourself: no new relationships until you have moved past the last one. Take time for yourself.

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1.5.3: Sex, Gender, and Sexuality

When filling out official documents, you are often asked to provide your name, birthdate, and sex or gender. But have you ever been asked to provide your sex and your gender? It may not have occurred to you that sex and gender are not the same. However, sociologists and most other social scientists view sex and gender as conceptually distinct. Sex denotes biological characteristics and exists along a spectrum from male to female. Gender, on the other hand, denotes social and cultural characteristics that are assigned to different sexes. Sex and gender are not always synchronous, meaning they do not always line up in an easy-to-categorize way.

Sex

"Sex" refers to physiological differences found among male, female, and various intersex bodies. Sex includes both primary sex characteristics (those related to the reproductive system) and secondary sex characteristics (those that are not directly related to the reproductive system, such as breasts and facial hair). In humans, the biological sex of a child is determined at birth based on several factors, including chromosomes, gonads, hormones, internal reproductive anatomy, and genitalia. Biological sex has traditionally been conceptualized as binary in Western medicine, typically divided into male and female. However, anywhere from 1.0 to 1.7% of children are born intersex, having a variation in sex characteristics (including chromosomes, gonads, or genitals) that do not allow them to be distinctly identified as male or female. Due to the existence of multiple forms of intersex conditions (which are more prevalent than researchers once thought), many view sex as existing along a spectrum, rather than simply two mutually exclusive categories.

Gender

A person's sex, as determined by his or her biology, does not always correspond with their gender; therefore, the terms "sex" and "gender" are not interchangeable. "Gender" is a term that refers to social or cultural distinctions associated with being male, female, or intersex. Typically, babies born with male sex characteristics (sex) are assigned as boys (gender); babies born with female sex characteristics (sex) are assigned as girls (gender). Because our society operates in a binary system when it comes to gender (in other words, seeing gender as only having two options), many children who are born intersex are forcibly assigned as either a boy or a girl and even surgically "corrected" to fit a particular gender. Scholars generally regard gender as a social construct—meaning that it does not exist naturally, but is instead a concept that is created by cultural and societal norms.

Gender Identity: Cisgender versus Transgender

Gender identity is a person's sense of self as a member of a particular gender. Individuals who identify with a role that corresponds to the sex assigned to them at birth (for example, they were born with male sex characteristics, were assigned as a boy, and identify today as a boy or man) are cisgender. Those who identify with a role that is different from their biological sex (for example, they were born with male sex characteristics, were assigned as a boy, but identify today as a girl, woman, or some other gender altogether) are often referred to as transgender. The term "transgender" encompasses a wide range of possible identities, including agender, genderfluid, genderqueer, two-spirit (for many indigenous people), androgynous, and many others. The prefix "trans-" comes from Latin, meaning "across from" or "on the other side of". In contrast, the prefix "cis-" means "on this side of".

Cultural Variations of Gender

Since the term "sex" refers to biological or physical distinctions, characteristics of sex will not vary significantly between different human societies. For example, persons of the female sex, in general, regardless of culture, will eventually menstruate and develop breasts that can lactate. Characteristics of gender, on the other hand, may vary greatly between different societies. For example, in American culture, it is considered feminine (or a trait of the female gender) to wear a dress or skirt. However, in many Middle Eastern, Asian, and African cultures, dresses or skirts (often referred to as sarongs, robes, or gowns) can be considered masculine. Similarly, the kilt worn by a Scottish male does not make him appear feminine in his culture.

Sexuality

Human sexuality refers to a person's sexual interest in and attraction to others, as well as their capacity to have erotic experiences and responses. A person's sexual orientation is their emotional and sexual attraction to particular sexes or genders, which often shapes their sexuality. Sexuality may be experienced and expressed in a variety of ways, including thoughts, fantasies, desires, beliefs, attitudes, values, behaviors, practices, roles, and relationships. These may manifest themselves in biological, physical, emotional, social, or spiritual aspects. The biological and physical aspects of sexuality largely concern the human reproductive functions, including the human sexual-response cycle and the basic biological drive that exists in all species. Emotional aspects of sexuality include bonds between individuals that are expressed through profound feelings or physical manifestations of love, trust,

and care. Social aspects deal with the effects of human society on one's sexuality, while spirituality concerns an individual's spiritual connection with others through sexuality.

LGBTQ+ Health

People who are lesbian, gay, bisexual, transgender, queer, and/or questioning (LGBTQ+) are members of every community. They are diverse, come from all walks of life, and include people of all races and ethnicities, all ages, all socioeconomic statuses, and from all parts of the United States and world. The perspectives and needs of LGBTQ+ people should be routinely considered in public health efforts to improve the overall health of every person and eliminate health disparities.

In addition to considering the needs of LGBTQ+ people in programs designed to improve the health of entire communities, there is also a need for culturally competent medical care and prevention services that are specific to this population. Social inequality is often associated with poorer health status, and sexual orientation has been associated with multiple health threats. Members of the LGBTQ+ community are at increased risk for a number of health threats when compared to their heterosexual peers. Differences in sexual behavior account for some of these disparities, but others are associated with social and structural inequities, such as the stigma and discrimination that LGBTQ+ populations still experience.

LGBTQ+ sexual health and well-being is affected by numerous social and cultural challenges across the life course, contributing to negative health outcomes and posing barriers to attain such protective health indicators as marriage and family formation, community support, and inclusion in faith communities. The incidence of hate crimes and discrimination promulgated through the denial of equal rights contribute to the perpetuation of homophobia as a structural norm.

As a result of cultural and societal discrimination, many LGBTQ+ people suffer an added burden of stress and experience health disparities, such as:

- Potential difficulties in getting or keeping health insurance, and possible employment instability.
- Limited access to high quality health care that is responsive to LGBTQ+ health issues.
- Mental health problems and unhealthy coping skills, such as substance abuse, risky sexual behaviors, and suicide attempts.
- Challenges or difficulties with being open about one's sexual orientation, which can increase stress, limit social support, and negatively affect overall health.
- The effects of homophobia, stigma and discrimination can be especially hard on adolescents and young adults. In addition to an increased risk of being bullied at school, they are also at risk of being rejected by their families and, as a result, are at increased risk of homelessness.

Whether you are gay or straight, you can help reduce homophobia, stigma, and discrimination in your community and decrease the associated negative health effects. Even small things can make a difference, such as accepting and supporting a family member, friend, or co-worker.

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1.5.4: Pregnancy

Pregnancy is the term used to describe the period in which a fetus develops inside a womb or uterus. Pregnancy usually lasts about 40 weeks, or just over 9 months, as measured from the last menstrual period. Health care providers refer to three segments of pregnancy, called trimesters.

Pregnancy begins when a males sperm fertilizes a females egg. When fertilization occurs it is called conception. On average, females release one egg each month, which is called ovulation. Thus, for pregnancy to occur, sperm only has a few days each month where it can meet the egg and attempt to fertilize it. It is important to understand a females menstrual cycle to understand the days where pregnancy is most likely to occur.

It is very important to note that many women have irregular cycle lengths, might ovulate more then once in a month, and might ovulate more than one egg at a time, thus the fertility cycle is not an exact science.

The following description of the fertility cycle is for an average cycle of 28 days.

- Day 1: The first day of menstruation, or period. Periods typically last between 2-7 days.
- Days 1-7: Menstruation
- Sperm can remain alive and viable in the females body up to 5 days after sexual intercourse. So, it's possible to have intercourse up to 5 days before ovulation and get pregnant as a result.
- Days 12-16: The egg is typically released, called Ovulation, around day 14 of the cycle, however it is best to estimate the release between days 12-16.
- Days 12-17: Once an egg is released from the ovaries, its life span is very short. Conception can only occur if the egg is fertilized 12 to 24 hours after the time of actual ovulation.

These biologic realities mean the actual period of viable fertility can last anywhere from 5 to 8 days. In general, you're most fertile during the following times:

- the 5 days before ovulation
- the day of ovulation
- within 12 to 24 hours after ovulation

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1.5.5: Contraception and Abortion

As you have learned, passion is one of the three components of love, as defined by Sternberg, and relates to physical attraction and sexual desire. When entering into a sexual relationship, it is important to understand the various ways you can protect yourself from unwanted pregnancy and sexually transmitted diseases (STD's); although all contraceptive methods are intended to reduce unwanted pregnancy, not all of them also protect against STD's. There are many forms of contraception to choose from whether it is meant to be permanent or temporary (reversible) and whether it prevents pregnancy by either adjusting hormones, placing a barrier between the sperm and egg, or abstaining during ovulation. How effective each method is at preventing pregnancy is impacted by how the couple uses the method. If a person uses the method perfectly, called **Perfect Use Effectiveness**, it will have a higher effectiveness than those who are considered typical users, called **Typical Use Effectiveness**. The only contraceptive method that is 100% effective is abstinence. Pregnancy is a possibility even if you are perfectly using contraceptive methods with high effectiveness. Unwanted pregnancies can be terminated through abortion.

Contraceptive Methods

It is important for sexual partners to discuss contraceptive options, asking question such as:

- Does either partner have allergies, such as a latex allergy?
- Are the partners concerned about transmission of sexually transmitted diseases?
- Can the female take hormonal birth control or are they contraindicated for them?
- Will it be challenging for the female to take a pill every day at the same time?
- Does either partner have religious beliefs that impact the use of contraception?

The answers to your questions may help in deciding which option to choose.

For example, couples who are concerned about STD's need to choose contraceptive options that reduce the transmission of STD's which means choosing to use either a male condom or female condom. Male condoms are much cheaper and easier to find than female condoms. It is important to understand that surgical, hormonal, or natural birth control options do not protect against STD's. Couples who are in a long term committed relationship and are not concerned about STD's and would like a long term contraceptive might choose a permanent surgical option or a long term option like an Intrauterine Device (IUD). Couples who have a latex allergy and still want to use condoms can choose lambskin or polyurethane condoms instead of the more commonly used latex condoms. Couples who are very concerned about unwanted pregnancies will want to choose a method with the highest effectiveness rate and ensure they use the method as perfectly as possible, they may also want to combine methods such as using birth control pills and condoms.

When choosing a contraceptive method it is important to understand the difference between surgical, hormonal, barrier, or fertility awareness methods.

- Surgical method (permanent option)
  - Permanent methods of birth control that are also referred to as sterilization. These methods are for those who are sure that they do not want to conceive a child. Women choosing a permanent method can have their fallopian tubes tied or closed off, called a tubal ligation, or they can choose to have a small tube inserted into the fallopian tubes, called transcervical sterilization, which irritates the fallopian tubes causing scar tissue to form and close off the tubes. Men commonly get a vasectomy which is an outpatient procedure in which the tube that carries sperm is cut.
- Hormonal method (reversible)
  - When a woman is pregnant they no longer release an egg each month and if there is no egg released, they cannot become pregnant. Hormonal methods reduce the chance of pregnancy by providing hormones to the woman that tricks the woman's body into thinking they are pregnant, thus the egg is not released each month.
- Barrier method (reversible)
  - In order for pregnancy to occur the egg from a woman and the sperm from a man must meet. If the sperm fertilizes the egg then conception, or pregnancy, occurs. Barrier methods of birth control work by creating a barrier in which the egg and sperm cannot meet.
- FAM: Fertility Awareness Method (reversible)
  - In order for pregnancy to occur, the sperm from the male must meet the egg from the female. The egg from the female is typically released only one time per month, called ovulation, so the sperm has a limited time window to meet the egg. The

FAM is based on avoiding sexual intercourse when it is most likely that the sperm and egg can meet. FAM must also take into consideration that sperm can live in a woman's body up to 5 days.

Table 1.5.5.3 : Type, Effectiveness, Risk, and Use of Common Contraceptive Methods

Name(s)	Type	Percentage of unwanted pregnancy within first year of typical use	Protect against STD's?	Side effects and risks* *These are not all of the possible side effects and risks. Talk to your doctor or nurse for more information.	How often you have to take or use
Abstinence (no sexual contact)	Natural- reversible	Unknown (0 for perfect use)	Yes	No medical side effects	No action required, but it does take willpower. You may want to have a back-up birth control method, such as condoms.
Female sterilization (tubal ligation, "getting your tubes tied")	Surgical- permanent	Less than 1%	No	Pain, bleeding, risk of infection	Surgery completed one time. No action required after surgery
Male sterilization (vasectomy)	Surgical- permanent	Less than 1%	No	Pain, bleeding, risk of infection	Surgery completed one time. No action required after surgery
Implantable rod (Implanon®, Nexplanon®)	Hormonal- reversible	Less than 1%	No	Headache, irregular periods, weight gain, sore breasts. Less common risk includes difficulty in removing the implant	No action required for up to 3 years before removing or replacing
Copper intrauterine device (IUD) (ParaGard®)	Nonhormonal- reversible	Less than 1%	No	Cramps for a few days after insertion. Missed periods, bleeding between periods, heavier periods. Less common but serious risks include pelvic inflammatory disease and the IUD being expelled from the uterus or going through the wall of the uterus.	No action required for up to 10 years before removing or replacing

Name(s)	Type	Percentage of unwanted pregnancy within first year of typical use	Protect against STD's?	Side effects and risks* *These are not all of the possible side effects and risks. Talk to your doctor or nurse for more information.	How often you have to take or use
Hormonal intrauterine devices (IUDs) (Liletta, Mirena®, and Skyla®)	Hormonal-reversible	Less than 1%	No	Irregular periods, lighter or missed periods. Ovarian cysts. Less common but serious risks include pelvic inflammatory disease and the IUD being expelled from the uterus or going through the wall of the uterus.	No action required for 3 to 5 years, depending on the brand, before removing or replacing
Shot/injection (Depo-Provera®)	Hormonal-reversible	4-6%	No	Bleeding between periods, missed periods Weight gain Changes in mood Sore breasts Headaches Bone loss with long-term use (bone loss may be reversible once you stop using this type of birth control)	Get a new shot every 3 months
Oral contraceptives, combination hormones ("the pill" or "mini-pill"))	Hormonal-reversible	7-9%	No	Headache, nasuea, sore breasts, changes in your period, changes in mood, weight gain, high blood pressure. Less common but serious risks include blood clots, stroke and heart attack; the risk is higher in smokers and women older than 35	Take at the same time every day

Name(s)	Type	Percentage of unwanted pregnancy within first year of typical use	Protect against STD's?	Side effects and risks* *These are not all of the possible side effects and risks. Talk to your doctor or nurse for more information.	How often you have to take or use
Skin patch (Xulane®)	Hormonal- reversible	7-9% May be less effective in women weighing 198 pounds or more	No	Skin irritation, headache, nasuea, sore breasts, changes in your period, changes in mood, weight gain, high blood pressure. Less common but serious risks include blood clots, stroke and heart attack; the risk is higher in smokers and women older than 35	Apply to skin for 21 days, remove for 7 days, replace with a new patch
Vaginal ring (NuvaRing®)	Hormonal- reversible	7-9%	No	Vaginal irritation and discharge, headache, nasuea, sore breasts, changes in your period, changes in mood, weight gain, high blood pressure. Less common but serious risks include blood clots, stroke and heart attack; the risk is higher in smokers and women older than 35	Insert into the vagina for 21 days, remove for 7 days, replace with a new ring
Diaphragm with spermicide (Koromex®, Ortho-Diaphragm®)	Barrier- reversible	12%	No	Irritation, allergic reactions, urinary tract infection (UTI), vaginal infections. Rarely, toxic shock if left in for more than 24 hours. Using a spermicide often might increase your risk of getting HIV.	Insert into vagina before sexual intercourse. Remove after intercourse. Get refitted if you gain or lose weight or give birth

Name(s)	Type	Percentage of unwanted pregnancy within first year of typical use	Protect against STD's?	Side effects and risks* *These are not all of the possible side effects and risks. Talk to your doctor or nurse for more information.	How often you have to take or use
Sponge with spermicide (Today Sponge®)	Barrier- reversible	12-27% 12% for those who haven't had a child, 27% for those who have given birth	No	Irritation, allergic reactions, urinary tract infection (UTI), vaginal infections. Rarely, toxic shock if left in for more than 24 hours. Using a spermicide often might increase your risk of getting HIV.	Insert into vagina before sexual intercourse. Remove after intercourse.
Cervical cap with spermicide (FemCap®)	Barrier- reversible	17-29%	No	Irritation, allergic reactions, urinary tract infection (UTI), vaginal infections. Rarely, toxic shock if left in for more than 24 hours. Using a spermicide often might increase your risk of getting HIV.	Insert into vagina before sexual intercourse. Remove after intercourse (up to 2 days after).
Male condom	Barrier- reversible	13-18%	Yes	Condom may tear, break or slip off. Irritation or allergic reactions to latex condoms	Put on penis before sexual intercourse. Use each time you have sex. Never use a male and female condom together.
Female condom ("internal condom")	Barrier- reversible	21	Yes	Condom may tear or slip out. Irritation or allergic reactions could occur.	Insert into vagina or anus before sexual intercourse. Use each time you have sex. Never use a male and female condom together.

Name(s)	Type	Percentage of unwanted pregnancy within first year of typical use	Protect against STD's?	Side effects and risks* *These are not all of the possible side effects and risks. Talk to your doctor or nurse for more information.	How often you have to take or use
Withdrawal — when a man takes his penis out of a woman's vagina (or "pulls out") before he ejaculates (has an orgasm or "comes")	Natural- reversible	22	No	Sperm can be released before the man pulls out, putting you at risk for pregnancy.	Use each time you have sex
Fertility Awareness Method: Calendar, temperature, or rhythm method	Natural- reversible	24	No	Can be hard to know the days you are most fertile (when you need to avoid having sex or use back-up birth control)	Depending on method used, takes planning each month
Spermicide alone	Barrier- reversible	28 Works best if used along with a barrier method, such as a diaphragm	No	Irritation, allergic reactions, urinary tract infection (UTI), vaginal infections. Using a spermicide often might increase your risk of getting HIV.	Use each time you have sex

Abortion and Roe v. Wade

"Jane Roe," a woman who wanted to safely and legally end her pregnancy, challenged a Texas statute that made it a crime to perform an abortion unless the woman's life was in danger. In the ruling, the U.S. Supreme Court recognized for the first time that the constitutional right to privacy "is broad enough to encompass a woman's decision whether or not to terminate her pregnancy" (Roe v. Wade, 1973). Roe v. Wade has come to be known as the case that legalized abortion nationwide. On June 24, 2022, after upholding this constitutional right for nearly 50 years, the U.S. Supreme Court ruled that "the Constitution does not confer a right to abortion," thus voted to reverse their decision, leaving the ability to have an abortion to state law. It is estimated that about half of the states in America will either completely ban, or severely reduce, access to a legal and safe abortion.

There is no way to know how many women died receiving illegal abortions prior to the legalization of abortion in 1973. However, since the early 20th century, researchers, scientists, and doctors have attempted to estimate the number of illegal abortions performed and the corresponding death rate. Some estimates state that it could have been as low as 200,000 illegal abortions to 1.2 million illegal abortions performed each year causing as many as 5,000 to 10,000 annual deaths.

Although we do not know exactly how many deaths occured prior to the legalization of abortion in 1973, we do know that after 1973 when abortions were legal they were very safe causing less than 1 death per 100,000 people. Legal abortions are so safe that in 2018 there were only two deaths total from complications of an abortion. Thus, the death rate before 1973 and after were very likely dramatically different. The rate of complication for abortion is less than childbirth itself, and even lower than wisdom teeth removal.

Legal abortions in the U.S. are not only safe, but also very common. In the US, in 2019, there were 195 abortions per 1,000 live births, meaning about one out of every five pregnancies was terminated through abortion[7]. In 2019, the majority of abortions occurred early in gestation (≤9 weeks), when the risks for complications are lowest. In addition, over the past 10 years, the number of abortions performed ≤9 weeks' gestation increased from 74.8% in 2010 to 77.4% in 2019. Abortion can be completed with medication or by a procedure which is often called surgical abortion or aspiration abortion.

A committee of the National Academies of Sciences, Engineering, and Medicine reviewed the data available and confirmed in their report in 2018 that all forms of abortion including medication and aspiration abortion are safe and effective and that the only factors decreasing safety are those decreasing access[8][9]. A medication abortion can be completed at home, is non-invasive, and can be done up to 11 weeks, whereas an aspiration abortion is performed in a hospital or clinic and can be done up to 16 weeks.

It will be years before data is available to understand how the U.S. Supreme Court's decision to overturn the constitutional right to an abortion may impact women's health across the U.S., especially on a state-by-state basis where access may lead to health disparities.

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1.5.6: End-of-Chapter Material

Key takeaways for this Chapter

- Social wellness is an important part of overall wellness.
- Love is difficult to define.
- Sternberg defines love as including varying levels of intimacy, passion, and commitment.
- A person own “love story” may impact their own relationships.
- It is important to understand the differences between healthy and unhealthy relationships.
- Effective communication includes being assertive and using “I” statements.
- Sex and Gender mean two different things.
- Pregnancy occurs when a females egg is fertilized by a males sperm, this is called conception.
- Various contraceptive methods are available that can help to reduce the chances of pregnancy and STD transmission.
- Abortion is the act of ending a pregnancy.

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1.5.7: Relationships, Sexuality, and Contraception- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

Got a wicked problem? First, tell me how you make toast



How peer educators can transform sex education





How to disagree productively and find common ground



How to fix a broken heart



How to speak so that people want to listen



The difference between healthy and unhealthy love



The end of Roe v. Wade — and what comes next for reproductive freedom



The physics of human sperm vs. the physics of the sperm whale



What doctors should know about gender identity



What is love?

https://med.libretexts.org/@go/page/87994



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SECTION OVERVIEW

1.6: Recognizing Drugs and Avoiding Addiction

Learning Objectives

By the end of this chapter you will be able to:

- Explain what occurs in the body when someone has an addiction.
- Recognize risk factors for addiction
- Compare and contrast health effects of common illicit drugs
- Describe impacts of drug use on the individual, family, and community.
- Identify treatments for drug abuse.

Why is it important to understand how different drugs impact the body and mind?

What are the risks associated with using drugs?

What causes addiction?

This chapter focuses on drug use and addiction. Often addiction is associated with the consumption of addictive drugs, however addiction is broader than just the consumption of addictive substances and also includes behavioral addictions, such as the addiction to gambling, pornography, internet use, and exercise. There is debate whether behavioral addictions and substance addictions should be grouped together. This chapter will begin with a focus on substance addiction and will end with a focus on behavioral addictions.

1.6.1: Drug Use and Drug Addiction

1.6.2: Drug Facts

1.6.3: Drug Abuse or Addiction Treatment

1.6.4: Behavioral Addiction

1.6.5: End-of-Chapter Material

1.6.6: Recognizing Drugs and Addiction- Optional Continued Learning

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1.6.1: Drug Use and Drug Addiction

Drug addiction is a complex illness, many people don't understand why or how other people become addicted to drugs. They may mistakenly think that those who use drugs lack moral principles or the willpower to quit without recognizing that drugs change the brain in ways that make quitting hard, even for those who want to. In reality, drug addiction is a complex disease, and quitting usually takes more than good intentions or a strong will. A person may initially choose to take the drug, however over time they are incapable of choosing *not* to take the drug.

Fortunately, researchers know more than ever about how drugs affect the brain and have found treatments that can help people recover from drug addiction and lead productive lives.

Drug Use and Overdose

The National Survey on Drug Use and Health (NSDUH)[1] is published each year to share statistics on drug use in the U.S. Key findings from the 2022 annual report show that drug use is fairly common.

Among people aged 12 or older in year 2022:

- 59.8 percent (or 168.7 million people) used tobacco, alcohol, or an illicit drug in the past month (current user).
- 24.9 percent (or 70.3 million people) used illicit drugs in the past year.
  - Marijuana was the most commonly used illicit drug, with 22 percent (or 61.9 million people) using it in the past year.
- 3.7 percent (or 10.3 million people) misused central nervous system (CNS) stimulants in the past year.
- 3.4 percent (or 9.5 million people) misused opioids (heroin or prescription pain relievers) in the past year.
- 3.3 percent (or 9.3 million people) misused prescription pain relievers in the past year.
- 2.6 percent (or 7.1 million people) used hallucinogens in the past year.
- 17.3 percent (or 48.7 million people) had a Substance Use Disorder in the past year

Unfortunately both first time users and those who have an addiction are both at risk of possible drug overdose. Between 1999-2021 more than a million people have died from a drug overdose. Most recently, the majority of overdoses are caused by synthetic opioids. For example in 2020, about 92,000 drug overdose deaths occurred in the United States and 75% of the overdoses involved opioid use. Data from just 24 states from January–June 2019 showed that Illicitly manufactured fentanyl, heroin, cocaine, or methamphetamine (alone or in combination) were involved in nearly 85% of drug overdose deaths.

Drug Addiction

Addiction is a chronic disease characterized by drug seeking and use that is compulsive, or difficult to control, despite harmful consequences. The initial decision to take drugs is voluntary for most people, but repeated drug use can lead to brain changes that challenge an addicted person's self-control and interfere with their ability to resist intense urges to take drugs. These brain changes can be persistent, which is why drug addiction is considered a "relapsing" disease—people in recovery from drug use disorders are at increased risk for returning to drug use even after years of not taking the drug.

It's common for a person to relapse, but relapse doesn't mean that treatment doesn't work. As with other chronic health conditions, treatment should be ongoing and should be adjusted based on how the patient responds. Treatment plans need to be reviewed often and modified to fit the patient's changing needs.

What happens to the brain when a person takes drugs?

Most drugs affect the brain's "reward circuit" by flooding it with the chemical messenger dopamine. This reward system controls the body's ability to feel pleasure and motivates a person to repeat behaviors needed to thrive, such as eating and spending time with loved ones. This overstimulation of the reward circuit causes the intensely pleasurable "high" that can lead people to take a drug again and again.

As a person continues to use drugs, the brain adjusts to the excess dopamine by making less of it and/or reducing the ability of cells in the reward circuit to respond to it. This reduces the high that the person feels compared to the high they felt when first taking the drug, an effect known as **tolerance**, which involves taking more of the drug to try to achieve the same dopamine high. It can also cause them to get less pleasure from other things they once enjoyed, like food or social activities.

Long-term use can cause changes in other brain chemical systems and circuits that can negatively impact a persons learning, judgment, decision-making, stress, memory, and behavior. Long-term use can also lead to drug dependence, where your body is

used to functioning with the drug in your system. If you are dependent on a drug and the drug is removed, it can cause withdrawals symptoms. **Withdrawal** symptoms vary depending on the type of drug dependence and may include tremors (shaking), cravings, agitation, nausea, sweating, or changes in mood.

Despite being aware of these harmful outcomes, many people who use drugs continue to take them, which is the nature of addiction.

Why do some people become addicted to drugs while others don't?

No one factor can predict if a person will become addicted to drugs. A combination of factors influences risk for addiction. The more risk factors a person has, the greater the chance that taking drugs can lead to addiction. For example:

- Biology
  - The genes that people are born with account for about half of a person's risk for addiction. Gender, ethnicity, and the presence of other mental disorders may also influence risk for drug use and addiction.
- Environment
  - A person's environment includes many different influences, from family and friends to economic status and general quality of life. Factors such as peer pressure, physical and sexual abuse, early exposure to drugs, stress, and parental guidance can greatly affect a person's likelihood of drug use and addiction.
- Developmental stages
  - Genetic and environmental factors interact with critical developmental stages in a person's life to affect addiction risk. Although taking drugs at any age can lead to addiction, the earlier that drug use begins, the more likely it will progress to addiction. This is particularly problematic for teens. Because areas in their brains that control decision-making, judgment, and self-control are still developing, teens may be especially prone to risky behaviors, including trying drugs.

What are some consequences of drug abuse?

Drug abuse is a serious public health problem that affects many communities and families in some way. Each year drug abuse causes millions of serious illnesses or injuries among Americans. Drug abuse also plays a role in many major social problems, such as drugged driving, violence, stress, and child abuse. Drug abuse can lead to homelessness, crime, and missed work or problems with keeping a job. It harms unborn babies and destroys families.

Some people who are addicted don't believe that they are sick and out of control, so they don't look for treatment. They don't see the problems they are causing themselves and those around them. Other people who are addicted are aware of the problem, but may be so upset and confused that they do not know how to ask for or get help.

Drugs don't just hurt the person taking them. Everyone connected to the person can get hurt. When you or a loved one abuse drugs, everyday life can feel out of control.

Drug abuse affects the family in many ways, including:

- When a person has a drug problem, they have a disease that can hurt the family.
- Drug abuse puts a lot of stress on parents, brothers and sisters, children, grandparents—anyone who is part of the home.
- Family members might fight a lot because of the problems the drug abuse is causing.
- The drug user might do and say things that upset neighbors and friends, and make the family ashamed.

When family members take drugs, you may experience situations such as:

- You generally can't count on them to do what they say they will do.
- They may forget or get distracted because their focus is on getting and taking drugs.
- They might lie or steal money to buy drugs.
- They might get fired from their jobs.
- They might not come home at night.
- They may do bad things they would never do if they weren't abusing drugs.

Drug abuse can cause many problems including: Fighting and violence in and outside the home; money problems; trouble at school; trouble at work, losing a job; trouble in relationships; child abuse, neglect; driving accidents; and arrests and jail.

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1.6.2: Drug Facts

The following information provides short-term and long-term effects of various drugs along with the health-related issues. Additional drug facts can be reviewed at The National Institute of Drug Abuse- Drug Facts website.

Marijuana

Marijuana is made from the hemp plant, Cannabis sativa. The main psychoactive (mind-altering) chemical in marijuana is delta-9-tetrahydrocannabinol, or THC.

Table \(\PageIndex{1}\): Possible Health Effects of Marijuana

Time	Effects
Short-term	Enhanced sensory perception and euphoria followed by drowsiness/relaxation; slowed reaction time; problems with balance and coordination; increased heart rate and appetite; problems with learning and memory; hallucinations; anxiety; panic attacks; psychosis.
Long-term	Mental health problems, chronic cough, frequent respiratory infections.
Other Health-related Issues	Youth: possible loss of IQ points when repeated use begins in adolescence. Pregnancy: babies born with problems involving attention, memory, and problem solving.

Synthetic cannabinoids

Synthetic cannabinoids are human-made mind-altering chemicals that are either sprayed on dried, shredded plant material so they can be smoked or sold as liquids to be vaporized and inhaled in e-cigarettes and other devices. These products are also known as herbal or liquid incense, or synthetic marijuana (or fake weed).

Table \(\PageIndex{2}\): Possible Health Effects of Synthetic cannabinoids

Time	Effects
Short-term	Rapid heart rate, vomiting, violent behavior, suicidal thoughts, altered perception, symptoms of psychosis
Long-term	Withdrawal symptoms: headaches, anxiety, depression, irritability
Other Health-related Issues	Overdose may cause: toxic reactions, elevated blood pressure, reduced blood supply to the heart, kidney damage, and seizures Death may occur if mixed with synthetic opioids such as Fentanyl.

Cocaine

Cocaine is a powerfully addictive stimulant drug made from the leaves of the coca plant native to South America.

Table \(\PageIndex{3}\): Possible Health Effects of Cocaine

Time	Effects
Short-term	Narrowed blood vessels; enlarged pupils; increased body temperature, heart rate, and blood pressure; headache; abdominal pain and nausea; euphoria; increased energy, alertness; insomnia, restlessness; anxiety; erratic and violent behavior, panic attacks, paranoia, psychosis; heart rhythm problems, heart attack; stroke, seizure, coma.

Time	Effects
Long-term	Loss of sense of smell, nosebleeds, nasal damage and trouble swallowing from snorting; infection and death of bowel tissue from decreased blood flow; poor nutrition and weight loss from decreased appetite.
Other Health-related Issues	Pregnancy: premature delivery, low birth weight, smaller head circumference. Risk of HIV, hepatitis, and other infectious diseases from shared needles.

Methamphetamine

Methamphetamine is an extremely addictive stimulant amphetamine drug.

Table \(\PageIndex{4}\): Possible Health Effects of Methamphetamine

Time	Effects
Short-term	Increased wakefulness and physical activity; decreased appetite; increased breathing, heart rate, blood pressure, temperature; irregular heartbeat.
Long-term	Anxiety, confusion, insomnia, mood problems, violent behavior, paranoia, hallucinations, delusions, weight loss, severe dental problems (“meth mouth”), intense itching leading to skin sores from scratching.
Other Health-related Issues	Pregnancy: premature delivery; separation of the placenta from the uterus; low birth weight; lethargy; heart and brain problems. Risk of HIV, hepatitis, and other infectious diseases from shared needles.

Prescription CNS Depressants

Prescription CNS depressants are medicines that include sedatives, tranquilizers, and hypnotics that slow down brain activity and can cause sleepiness and loss of coordination. Continued use can lead to physical dependence and withdrawal symptoms if use is stopped. These includes drugs classified as Benzodiazepines, Non-Benzodiazepine Sedative Hypnotics, and Barbiturates.

Table \(\PageIndex{5}\): Possible Health Effects of CNS Depressants

Time	Effects
Short-term	Drowsiness, slurred speech, poor concentration, confusion, dizziness, problems with movement and memory, lowered blood pressure, slowed breathing.
Long-term	Physical dependence, withdrawal, possibility of seizures from rebound effect.
Other Health-related Issues	Sleep medications are sometimes used as date rape drugs (e.g. Rohypnol). Risk of HIV, hepatitis, and other infectious diseases from shared needles.
In Combination with Alcohol	Further slows heart rate and breathing, which can lead to death.

Prescription CNS Stimulants

Prescription stimulants are medicines generally used to treat attention-deficit hyperactivity disorder (ADHD) and narcolepsy—uncontrollable episodes of deep sleep. They increase alertness, attention, and energy.

Table \(\PageIndex{6}\): Possible Health Effects of CNS Stimulants

Time	Effects
Short-term	Increased blood pressure and heart rate, increased breathing, decreased blood flow, increased blood sugar, and opened-up breathing passages.
Long-term	Repeated misuse of prescription stimulants, even within a short period, can cause psychosis, anger, or paranoia.
Other Health-related Issues	At high doses, prescription stimulants can lead to a dangerously high body temperature, an irregular heartbeat, heart failure, and seizures.

Prescription Opioids

Opioids are a class of drugs naturally found in the opium poppy plant. Opioids are often used as medicines because they contain chemicals that relax the body and can relieve pain. Opioids can cause euphoria and are often used non-medically, leading to overdose deaths. Heroin is one of the world's most dangerous opioids, and is never used as a medicine in the United States.

Table \(\PageIndex{7}\): Possible Health Effects of Opioids

Time	Effects
Short-term	Pain relief, drowsiness, nausea, constipation, euphoria, confusion, slowed breathing, death.
Long-term	Physical dependence, possible brain damage.
Other Health-related Issues	Pregnancy: Miscarriage, low birth weight, neonatal abstinence syndrome. Older adults: higher risk of accidental misuse or abuse because many older adults have multiple prescriptions, increasing the risk of drug-drug interactions, and breakdown of drugs slows with age; also, many older adults are treated with prescription medications for pain. Risk of HIV, hepatitis, and other infectious diseases from shared needles.
In Combination with Alcohol	Dangerous slowing of heart rate and breathing leading to coma or death.

Heroin

Heroin is an opioid drug made from morphine. Prescription opioid pain medicines such as OxyContin® and Vicodin® have effects similar to heroin. Research suggests that misuse of these drugs may open the door to heroin use.

Table \(\PageIndex{8}\): Possible Health Effects of Heroin

Time	Effects
Short-term	Euphoria; warm flushing of skin; dry mouth; heavy feeling in the hands and feet; clouded thinking; alternate wakeful and drowsy states; itching; nausea; vomiting; slowed breathing and heart rate.
Long-term	Collapsed veins; abscesses (swollen tissue with pus); infection of the lining and valves in the heart; constipation and stomach cramps; liver or kidney disease; pneumonia.
Other Health-related Issues	Pregnancy: miscarriage, low birth weight, neonatal abstinence syndrome. Risk of HIV, hepatitis, and other infectious diseases from shared needles.
In Combination with Alcohol	Dangerous slowdown of heart rate and breathing, coma, death.

Fentanyl

Fentanyl is a powerful synthetic opioid that is similar to morphine but is 50 to 100 times more potent. Like morphine, it is a medicine that is typically used to treat patients with severe pain, especially after surgery.

Synthetic opioids, including fentanyl, are now the most common drugs involved in drug overdose deaths in the United States. In 2022, 88 percent of opioid-related deaths involved fentanyl compared to 14.3 percent in 2010. Some drug dealers mix fentanyl with other drugs, such as heroin, cocaine, methamphetamine, and MDMA. This is because it takes very little to produce a high with fentanyl, making it a cheaper option.

Table \(\PageIndex{9}\): Possible Health Effects of Heroin

Time	Effects
Short-term	Extreme happiness, drowsiness, nausea, confusion, constipation, sedation, problems breathing, unconsciousness.
Long-term	Physical dependence, possible brain damage, withdrawal symptoms including: muscle and bone pain, sleep problems, diarrhea and vomiting, cold flashes with goose bumps, uncontrollable leg movements, and severe cravings.
Other Health-related Issues	Life-threatening symptoms of Fentanyl overdose include: slow/stop breathing, hypoxia, coma, brain damage, death.

Hallucinogens

Hallucinogens are a diverse group of drugs that alter a person's awareness of their surroundings as well as their own thoughts and feelings. They are commonly split into two categories: classic hallucinogens (such as LSD) and dissociative drugs (such as PCP). Both types of hallucinogens can cause *hallucinations*, or sensations and images that seem real though they are not. Additionally, dissociative drugs can cause users to feel out of control or disconnected from their body and environment. Common classic hallucinogens include: LSD,*Psilocybin*, *Peyote*, *DMT, and 251-NBOMe*. Common Dissociative hallucinogens include: PCP, ketamine, DXM, and Salvia.

Table \(\PageIndex{10}\): Possible Health Effects of Hallucinogens

Time	Effects
Short-term	Increased heart rate, nausea, intensified feelings and sensory experiences, changes in sense of time, increased blood pressure, breathing rate, or body temperature, loss of appetite, dry mouth, sleep problems, spiritual experiences, feelings of relaxation, uncoordinated movements, excessive sweating, panic, *paranoia*—extreme and unreasonable distrust of others, *psychosis*—disordered thinking detached from reality, and bizarre behaviors.
Long-term	Persistent psychosis, Hallucinogen Persisting Perception Disorder (HPPD), speech problems, memory loss, depression/suicide.
Other Health-related Issues	Disrupt communication between brain chemical systems throughout the brain and spinal cord. Large or prolonged doses of dissociative drugs, like PCP, can cause seizures, coma, or death. Unintentional injuries could be caused by doing things they wouldn't do in real life, like jumping out of a window.

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1.6.3: Drug Abuse or Addiction Treatment

Addiction is treatable and can be successfully managed, but the best is to prevent drug abuse in the first place.

As with most other chronic diseases, such as diabetes, asthma, or heart disease, treatment for drug addiction generally isn't a cure. Because addiction is a chronic disease, people can't simply stop using drugs for a few days and be cured. Most patients need long-term or repeated care to stop using completely and recover their lives.

People who are recovering from an addiction will be at risk for relapse for years and possibly for their whole lives. Research shows that combining addiction treatment medicines with behavioral therapy ensures the best chance of success for most patients. Treatment approaches tailored to each patient's drug use patterns and any co-occurring medical, mental, and social problems can lead to continued recovery.

More good news is that drug use and addiction are preventable. Results from NIDA-funded research have shown that prevention programs involving families, schools, communities, and the media are effective for preventing or reducing drug use and addiction. Although personal events and cultural factors affect drug use trends, when young people view drug use as harmful, they tend to decrease their drug taking. Therefore, education and outreach are key in helping people understand the possible risks of drug use. Teachers, parents, and health care providers have crucial roles in educating young people and preventing drug use and addiction.

Addiction treatment must help the person do the following:

- Stop using drugs
- Stay drug-free
- Be productive in the family, at work, and in society

Based on scientific research since the mid-1970s, the following key principles should form the basis of any effective treatment program:

- Addiction is a complex but treatable disease that affects brain function and behavior.
- No single treatment is right for everyone.
- People need to have quick access to treatment.
- Effective treatment addresses all of the patient's needs, not just his or her drug use.
- Staying in treatment long enough is critical.
- Counseling and other behavioral therapies are the most commonly used forms of treatment.
- Medications are often an important part of treatment, especially when combined with behavioral therapies.
- Treatment plans must be reviewed often and modified to fit the patient's changing needs.
- Treatment should address other possible mental disorders.
- Medically assisted detoxification is only the first stage of treatment.
- Treatment doesn't need to be voluntary to be effective.
- Drug use during treatment must be monitored continuously.
- Treatment programs should test patients for HIV/AIDS, hepatitis B and C, tuberculosis, and other infectious diseases as well as teach them about steps they can take to reduce their risk of these illnesses.

Successful treatment has several steps:

1. Detoxification (the process by which the body rids itself of a drug)
2. Behavioral counseling
    - Behavioral therapies help patients modify their attitudes and behaviors related to drug use and increase healthy life skills. Patients can receive treatment in many different settings with various approaches.
    - Outpatient behavioral treatment includes a wide variety of programs for patients who visit a behavioral health counselor on a regular schedule. Most of the programs involve individual or group drug counseling, or both. These programs typically offer forms of behavioral therapy such as cognitive-behavioral therapy, multidimensional family therapy, and motivational incentives (contingency management). Treatment is sometimes intensive at first, where patients attend multiple outpatient sessions each week. After completing intensive treatment, patients transition to regular outpatient treatment, which meets less often and for fewer hours per week to help sustain their recovery.
    - Inpatient or residential treatment can also be very effective, especially for those with more severe problems (including co-occurring disorders). Licensed residential treatment facilities offer 24-hour structured and intensive care, including safe housing and medical attention.

3. Medication (for opioid, tobacco, or alcohol addiction)
    - Medications help suppress withdrawal symptoms during detoxification. Detoxification is not in itself “treatment,” but only the first step in the process. Patients who do not receive any further treatment after detoxification usually resume their drug use.
    - Patients can use medications to help re-establish normal brain function and decrease cravings to reduce the chances of a relapse. People who use more than one drug, which is very common, need treatment for all of the substances they use.
4. Evaluation and treatment for co-occurring mental health issues such as depression and anxiety
5. Long-term follow-up to prevent relapse

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1.6.4: Behavioral Addiction

Substance and behavioral addictions are known as Addiction Disorders. With substance addiction the person is physically addicted to a substance or drug, however with a behavioral addiction they are addicted to the positive physical and mental feelings associated with the behavior. Both types of addiction impact a persons physical and mental health and both types of addiction have similar negative consequences. Both addictions are characterized by a dependence on a substance or an activity[2].

Experts have identified six criteria to determine a behavioral addiction:

1. Salience: Domination of a person's life by the activity
2. Euphoria: A 'buzz' or a 'high' is derived from the activity
3. Tolerance: The activity has to be undertaken to a progressively greater extent to achieve the same 'buzz'
4. Withdrawal Symptoms: Cessation of the activity leads to the occurrence of unpleasant emotions or physical effects
5. Conflict: The activity leads to conflict with others or self-conflict
6. Relapse and Reinstatement: Resumption of the activity with the same vigor subsequent to attempts to abstain, negative life consequences, and negligence of job, educational or career opportunities.

Common Behavioral Addiction Disorders include gambling addiction, shopping addiction, and internet gaming addiction.

As with drug addiction, the best treatment for behavioral addiction is prevention.

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1.6.5: End-of-Chapter Material

Key takeaways for Chapter 8

- Drug addiction is a chronic disease characterized by compulsive, difficult to control drug seeking despite harmful consequences.
- The pleasurable “high” along with changes in the brain can lead to drug dependence and addiction.
- Tolerance to a drug leads to increase use of the drug.
- Withdrawal symptoms can be a sign of drug dependence.
- No single factor can predict whether a person will become addicted to drugs.
- Drug addiction is treatable and can be successfully managed.
- Prevention is key. Teachers, parents, and health care providers have crucial roles in educating young people and preventing drug use and addiction.

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1.6.6: Recognizing Drugs and Addiction- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

A new way to help young people with their mental health



Break the silence for suicide attempt survivors



Debunking the myths of OCD



How do antidepressants work?



How gratitude rewires your brain



How to discover your “why” in difficult times



How to protect your mental well-being online — from a Gen-Zer



The gift and power of emotional courage



The Housing First approach to homelessness



The psychology of post-traumatic stress disorder



The voices in my head



What causes panic attacks, and how can you prevent them?



What is bipolar disorder?



What makes a good life? Lessons from the longest study on happiness



What’s normal anxiety — and what’s an anxiety disorder?



What’s your happiness score?



Why we get mad — and why it's healthy



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SECTION OVERVIEW

1.7: Evaluating Alcohol and Tobacco

Learning Outcomes

By the end of this chapter you will be able to:

- Define what is meant by a drink.
- Explain what excessive alcohol consumption entails.
- Estimate Blood Alcohol Concentrations (BAC).
- Describe short term and long term effects of alcohol consumption.
- Explain the harmful effects of Nicotine.
- Describe the short term and long term effects of tobacco use.

How much alcohol or tobacco is safe for you to consume?

How does alcohol or tobacco impact physical and emotional health?

How many people suffer from diseases causes by alcohol and tobacco?

What are steps you can take to reduce or eliminate your use of alcohol and tobacco?

Why is it important for your health to understand the use of alcohol and tobacco? Because each year, a large numbuer of deaths are attributed to the use of tobacco (480,000 deaths) or alcohol (140,000 deaths) in the United States. Using tobacco or alcohol are a lifestyle choice that increases your risk of death. It is important for you to be aware of the risks.

1.7.1: The Use of Alcohol

1.7.2: Health Effects of Alcohol Abuse

1.7.3: Rethinking Drinking

1.7.4: Tobacco Use

1.7.5: Quitting Smoking

1.7.6: End-of-Chapter Material

1.7.7: Alcohol and Tobacco- Optional Continued Learning

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1.7.1: The Use of Alcohol

What is a “drink”?

In the United States, a standard drink contains 0.6 ounces (14.0 grams or 1.2 tablespoons) of pure alcohol. Generally, this amount of pure alcohol is found in:

- 12-ounces of beer (5% alcohol content).
- 5-ounces of wine (12% alcohol content).
- 1.5-ounces of 80-proof (40% alcohol content) distilled spirits or liquor (e.g., gin, rum, vodka, whiskey).

Understanding Intoxication Levels: Blood Alcohol Concentration (BAC)

A blood alcohol test measures the level of Alcohol in your blood. This is typically done by using a breathalyzer or a blood test. Typically a blood alcohol concentration (BAC) greater than 0.08% is an indicator of intoxication, it means that you have 0.08 g of alcohol for every 100 ml of blood in your body. All states in the United States have adopted 0.08% as the legal limit for operating a motor vehicle for drivers aged 21 years or older (except for Utah, which adopted a 0.05% legal limit in 2018).

The liver is the main organ that processes, or metabolizes, alcohol and it can only process a small amount at a time, which is on average about one standard drink per hour. If you drink more alcohol than your liver can process then you will begin to feel the effects of intoxication. As blood alcohol concentration (BAC) increases, so does the effect of alcohol—as well as the risk of harm. When BAC reaches high levels, blackouts (gaps in memory), loss of consciousness (passing out), and death can occur.

It is important to recognize that the “one drink per hour” is an average and the actual time it takes your body to metabolize alcohol can vary for each person, for example it varies between men and women, whether you have eaten food, and the amount of alcohol consumed.

Examples of BAC Differences

- A male and female who weigh the same, eat the exact same meal, and drink the same amount of alcohol will have different BAC. Women tend to have higher body fat percentage than men and less total blood volume, which means there will be a higher concentration of alcohol in their blood thus increasing their BAC.
- Genetic differences can lead to differences in the amounts of enzymes that breakdown alcohol thus impacting the bodies ability to metabolize alcohol and increasing BAC.
- Females have lower amounts of an enzyme called Alcohol dehydrogenase (ADH). ADH is responsible for metabolizing alcohol in both the stomach and the liver. Since women have lower amounts of the enzyme they will have higher BAC than Males.
- A person who regularly drinks can build up tolerance because their body may increase production of the enzymes that breakdown alcohol.
- A person who drinks excessively for a long time might cause liver damage, which means their liver cannot effectively metabolize alcohol thus increasing their BAC.
- Men have a greater ratio of muscle to fat than do women. Muscle has a large amount of blood that flows through the muscle tissue. Fat has a much smaller amount of blood. The functional difference this makes is that alcohol is more diluted in a man’s body due to this larger volume of blood. Since women tend to have a higher percentage of body fat than men, this results in a higher BAC level for women compared to men.
- As the percentage of body fat increases, the BAC increases—this is because the total body water is lower, and that means that the alcohol is confined to this smaller volume.
- Absorption of alcohol is dependent on how quickly it can move through your stomach, this is called the gastric emptying rate. If your stomach is empty, gastric emptying increases, but if your stomach is full the gastric emptying slows down. Thus a full stomach will mean that the alcohol will take longer to absorb.

Alcohol Consumption Levels

Although the majority of U.S. adults consume alcoholic beverages, the Dietary Guidelines for Americans recommends limited consumption of alcohol and encourages people who have never drank alcohol to continue to abstain.

For those who choose to consume alcohol it is recommended to limit yourself to a **moderate consumption level** which is defined as up to 1 drink per day for women and up to 2 drinks per day for men.

People should avoid **excessive alcohol consumption**, which includes binge drinking, heavy drinking, and any drinking by pregnant women or people younger than age 21.

Binge drinking is the most common form of excessive drinking. About 66 percent of adults ages 21 through 59 report alcoholic beverage consumption in the past month, and of those, approximately half report binge drinking, sometimes multiple times per month, which can lead to high BAC levels.

A person is considered to be a **binge drinker** if they consume the following:

- For women, 4 or more drinks during a single occasion.
- For men, 5 or more drinks during a single occasion.

A person is considered to be a **heavy drinker** if they consume the following:

- For women, 8 or more drinks per week.
- For men, 15 or more drinks per week.

There are some people who should not drink any alcohol, including those who are:

- Younger than age 21.
- Pregnant or may be pregnant.
- Driving, planning to drive, or participating in other activities requiring skill, coordination, and alertness.
- Taking certain prescription or over-the-counter medications that can interact with alcohol.
- Suffering from certain medical conditions.
- Recovering from alcoholism or are unable to control the amount they drink.

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1.7.2: Health Effects of Alcohol Abuse

Drinking too much, on a single occasion or over time, can take a serious toll on your health. Here's how alcohol can affect your body:

- Brain
  - Alcohol interferes with the brain's communication pathways, and can affect the way the brain looks and works. These disruptions can change mood and behavior, and make it harder to think clearly and move with coordination.
  - Learning and memory problems, including dementia and poor school performance.
  - Mental health problems, including depression and anxiety.
  - Social problems, including lost productivity, family problems, and unemployment.
  - Violence, including homicide, suicide, sexual assault, and intimate partner violence.
- Heart
  - Drinking a lot over a long time or too much on a single occasion can damage the heart, causing problems including:
    - Cardiomyopathy – Impaired ability of the heart to deliver blood to the body, can lead to heart failure
    - Arrhythmias – Irregular heart beat
    - Stroke
    - High blood pressure
- Liver
  - Heavy drinking takes a toll on the liver, and can lead to a variety of problems and liver inflammations including:
    - Steatosis, or fatty liver: A condition where normal liver tissue is replaced by more than 5-6 percent fat. The accumulation of fat can cause inflammation, cell death, and scarring, which can lead to liver fibrosis.
    - Alcoholic hepatitis: Inflammation of the liver caused by drinking alcohol that can result in scar tissue.
    - Liver Fibrosis: Occurs when the liver is damaged and the organ develops scar tissue in response to the inflammation. Advanced liver fibrosis results in cirrhosis, liver failure, and portal hypertension and often requires liver transplantation.
    - Cirrhosis of the liver: A condition in which your liver is scarred and permanently damaged.
- Pancreas
  - Alcohol causes the pancreas to produce toxic substances that can eventually lead to pancreatitis, a dangerous inflammation and swelling of the blood vessels in the pancreas that prevents proper digestion.
- Cancer
  - Drinking too much alcohol can increase your risk of developing certain cancers, including cancers of the mouth, esophagus, throat, liver, and breast
- Immune System
  - Drinking too much can weaken your immune system, making your body a much easier target for disease. Chronic drinkers are more liable to contract diseases like pneumonia and tuberculosis than people who do not drink too much. Drinking a lot on a single occasion slows your body's ability to ward off infections, even up to 24 hours after getting drunk.
  - Risky sexual behaviors, including unprotected sex or sex with multiple partners. These behaviors can result in unintended pregnancy or sexually transmitted diseases, including HIV.

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1.7.3: Rethinking Drinking

Does alcohol impact my calorie intake?

Alcoholic beverages are not a component of the USDA Dietary Patterns and the calories consumed are considered discretionary. Alcohol provides 7 calories per gram consumed, and the ingredients in certain mixed drinks, including soda, mixers, and heavy cream, also can contribute to intake of added sugars and saturated fat. Thus, regular consumption of alcoholic beverages can make it challenging for adults to meet food group and nutrient needs while not consuming excess calories.

Why is being able to “hold your liquor” a concern?

For some people, it takes quite a few drinks to get a buzz or feel relaxed. Often they are unaware that being able to “hold your liquor” isn’t protection from alcohol problems, but instead a reason for caution. They tend to drink more, socialize with people who drink a lot, and develop a tolerance to alcohol. As a result, they have an increased risk for developing alcohol use disorder. The higher alcohol levels can also harm the liver, heart, and brain without the person drinking noticing until it’s too late. And all people who drink need to be aware that even moderate amounts of alcohol can significantly impair driving performance, even when they don’t feel a buzz from drinking.

Why are women’s low-risk limits different from men’s?

Research shows that women start to have alcohol-related problems at lower drinking levels than men do. One reason is that, on average, women weigh less than men. In addition, alcohol disperses in body water, and pound for pound, women have less water in their bodies than men do. So after a man and woman of the same weight drink the same amount of alcohol, the woman’s blood alcohol concentration will tend to be higher, putting her at greater risk for harm.

Isn’t drinking good for the heart?

The short answer is, it is unknown whether light-moderate alcohol consumption has positive health impacts, such as decreasing your risk of cardiovascular disease. Many studies have indicated that moderate alcohol consumption has protective health benefits (e.g., reducing risk of heart disease), and others show this may not be true. Thus, there is not a solid conclusion to this question and it warrants more research.

Can I do anything to protect my liver from the effects of too much alcohol?

There are no guarantees that anything will protect the liver from too much alcohol. Liver damage from heavy drinking happens in stages. Some relatively mild damage may happen after a single binge drinking episode, but this reverses itself if the heavy drinking stops. If heavy drinking continues, however, liver damage can progress through several more advanced stages, and repair becomes much more difficult, if not impossible. When the damage goes as far as cirrhosis, the only treatment is liver transplant. The best way to protect your liver’s health is by staying within the low-risk drinking limits or — if you already have liver damage or any signs of an alcohol problem — by quitting.

Also, it’s best if people who drink avoid acetaminophen[1] (found in Tylenol® and other medications). Even the standard recommended dose of acetaminophen can increase the risk of liver damage, particularly among people who drink heavily.

Quitting or Reducing Drinking

The first step, of course, is to decide whether cutting down or quitting is best for you. If you are thinking about quitting, recognize that one size doesn’t fit all, and it’s important to find options that appeal to you. Changing habits such as smoking, overeating, or drinking too much can take a lot of effort, and you may not succeed with the first try. Setbacks are common, but you learn more each time. Each try brings you closer to your goal. Whatever course you choose, give it a fair trial.

Rethink drinking: Begin by evaluating your own drinking

- Make a list of Pros & Cons: What are your reasons for and against making a change?
- Are you ready to change? See what to do if you’re not quite ready to change your drinking.
- To cut down or to quit … Consider which is best for you.
- Create a Change Plan to help you solidify your goal and how you’ll reach it.

Thinking about cutting back on alcohol?

- Review Tips to Try Cutting Back on Alcohol and select two or three to try in the next week or two. It may help to have reminders to reinforce your decision to make a change, such as automated smartphone alerts that you send yourself.

Support for Quitting Drinking

- You do not need to quit on your own, there is support available to help you!
- Try the NIAAA Alcohol Treatment Navigator. The *Navigator* helps adults find alcohol treatment for themselves or an adult loved one. The *Navigator* will steer you toward *evidence-based* treatment, which applies knowledge gained through decades of carefully designed scientific research. If you are seeking help for a teen, check out these recommended adolescent treatment resources. If you are seeking treatment for yourself, you are taking an important step in your route to recovery. You may wish to ask someone you trust to help you through the process and for support along the way.
- Evidence-based behavioral treatments, or "talk therapy," include:
  - Cognitive-behavioral therapy (CBT).
    - This form of therapy is focused on identifying the feelings and situations (called "cues") that lead to heavy drinking, and managing stress that can lead to relapse. The goal is to change the thought processes that lead to alcohol misuse and to develop the skills necessary to cope with everyday situations that might trigger problem drinking.
  - Motivational enhancement therapy.
    - This therapy focuses on helping the patient identify the pros and cons of seeking treatment, form a plan for making changes in drinking behavior, build confidence, and develop the skills needed to stick to the plan.
  - Contingency management approaches.
    - This approach is used to reinforce positive behaviors such as abstinence or regular attendance.
  - 12-Step Facilitation Therapy
    - An engagement strategy used in counseling sessions to increase a patient's active involvement in 12-step-based mutual help groups (such as AA), in addition to professionally-led outpatient treatment. The counselor works with the patient to encourage, review, and reinforce their participation in AA, in a structured process that may include reading assignments, journaling, and setting AA participation goals for the week.

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1.7.4: Tobacco Use

"More doctors smoke Camels than any other cigarette."

"Reach for a Lucky instead of a sweet."

"Lucky Strike Cigarettes . . . are less irritating to sensitive and tender throats than other cigarettes."

"Lucky Strike- To keep a slender figure no one can deny"

"Viceroys filter the smoke! As your dentist, I recommend Viceroys."

With doctors, dentists, and researchers proclaiming the healthful effects of smoking, smoking rates increased throughout the first half of the 20th century until 1964. In 1964 the U.S. Public Health Service released the first publication linking cigarette smoking to lung cancer, laryngeal cancer, and chronic bronchitis, it was known as the Surgeon Generals Report on Smoking and Health. The report ranked as among the top news stories of 1964. A year later the Federal Cigarette Labeling and Advertising Act of 1965 was passed requiring cigarette packages to include a health warning this was followed by the Public Health Cigarette Smoking Act of 1969 which regulated the advertising of tobacco products banning cigarette advertising in the broadcast media. With this report and the two Acts, cigarette smoking began to decline[2].

It is now well known, documented, and accepted that all forms of tobacco are harmful, and there is no safe level of exposure to tobacco. Tobacco use is the leading preventable cause of disease, disability, and death in the United States. According to the Centers for Disease Control and Prevention (CDC), cigarette smoking results in more than 480,000 premature deaths in the United States each year, about 1 in every 5 U.S. deaths. In 2020, 12.5% (nearly 13 of every 100) U.S. adults aged 18 years or older) currently smoked cigarettes. This means an estimated 30.8 million adults in the United States currently smoke cigarettes. Over 16 million people live with at least one disease caused by smoking, and 58 million nonsmoking Americans are exposed to secondhand smoke. Some good news is that smoking has declined from 20.9% (nearly 21 of every 100 adults) in 2005 to 18.7% (nearly 19 of every 100 adults) in 2022.

Secondhand Smoke

The harmful effects of smoking extend far beyond the smoker. Exposure to secondhand smoke can cause serious diseases and death. Since the 1964 Surgeon General's Report, 2.5 million adults who were nonsmokers died because they breathed secondhand smoke[3]. Exposure to secondhand smoke causes an estimated 41,000 deaths each year among adults in the United States, causing 7,333 annual deaths from lung cancer and 33,951 annual deaths from heart disease.

Electronic Cigarettes

What are they?

E-cigarettes are battery-operated devices that typically produce a flavored nicotine vapor that looks like tobacco smoke. E-cigarettes are sometimes called "e-cigs," "vapes," "e-hookahs," "vape pens," and "electronic nicotine delivery systems (ENDS)." Some e-cigarettes look like regular cigarettes, cigars, or pipes. Some look like USB flash drives, pens, and other everyday items.

Are e-cigarettes less harmful than regular cigarettes?

Although e-cigarette vapor does not contain the tar currently responsible for most lung cancer and other lung diseases, that doesn't mean e-cigarettes are safe. Many studies suggest e-cigarettes and noncombustible tobacco products may be less harmful than combustible cigarettes. However, there is not yet enough evidence to support claims that e-cigarettes and other ENDS are effective tools for quitting smoking.

E-cigarette aerosol generally contains fewer toxic chemicals than the deadly mix of 7,000 chemicals in smoke from regular cigarettes. However, e-cigarette aerosol is not harmless. It can contain harmful and potentially harmful substances, including nicotine, heavy metals like lead, volatile organic compounds, and cancer-causing agents. It is difficult for consumers to know what e-cigarette products contain. For example, some e-cigarettes marketed as containing zero percent nicotine have been found to contain nicotine

The U.S. Food and Drug Administration (FDA) has established rules for e-cigarettes and their liquid solutions in an effort to help protect the public from the dangers of tobacco use. Because e-cigarettes contain nicotine derived from tobacco, they are now subject to government regulation as tobacco products, including the requirement that both in-store and online purchasers be at least 18 years of age.

Can e-cigarettes help people quit smoking traditional cigarettes?

Because they deliver nicotine without burning tobacco, e-cigarettes are thought by many to be a safer alternative to conventional cigarettes, and some people even think they may help smokers lower nicotine cravings while they are trying to quit smoking. However, e-cigarettes are not currently approved by the FDA as a quit smoking aid. The U.S. Preventive Services Task Force, a group of health experts that makes recommendations about preventive health care, has concluded that evidence is insufficient to recommend e-cigarettes for smoking cessation in adults.

In a 2021 review of 61 studies focused on the use of e-cigarettes as a tool for quitting[4], the researchers were moderately confident that nicotine e-cigarettes help more people to stop smoking than nicotine replacement therapy or nicotine-free e-cigarettes, however more research is needed.

Smokeless Tobacco (Chewing Tobacco)

Smokeless tobacco is associated with many health problems. Smokeless tobacco contains cancer-causing agents and nicotine, which is highly addictive. Because young people who use smokeless tobacco can become addicted to nicotine, they may be more likely to also become cigarette smokers later.

Smokeless tobacco comes in three types: Chewing tobacco (loose leaf, plug, or twist and may come in flavors), Snuff (moist, dry, or in packets [U.S. snus]), and Dissolvables (lozenges, sticks, strips, orbs).

Using smokeless tobacco:

- Can lead to nicotine addiction
- Causes cancer of the mouth, esophagus (the passage that connects the throat to the stomach), and pancreas
- Is associated with diseases of the mouth
- Can increase risks for early delivery and stillbirth when used during pregnancy
- Can cause nicotine poisoning in children
- May increase the risk for death from heart disease and stroke

Health Effects of Tobacco Use

Smoking leads to disease and disability and harms nearly every organ of the body.

Although nicotine is addictive and can be toxic if ingested in high doses, it does not cause cancer—other chemicals are responsible for most of the severe health consequences of tobacco use. Tobacco smoke is a complex mixture of chemicals such as carbon monoxide, tar, formaldehyde, cyanide, and ammonia—many of which are known carcinogens. Carbon monoxide increases the chance of cardiovascular diseases. Tar exposes the user to an increased risk of lung cancer, emphysema, and bronchial disorders. Smoking has also been linked to leukemia, cataracts, and pneumonia. On average, adults who smoke die 10 years earlier than nonsmokers.

Smoking and Cancer

Cigarette smoking accounts for about one-third of all cancers, including cancers of the blood (acute myeloid leukemia), bladder, cervix, colon, rectum, esophagus, kidney, renal pelvis, larynx, liver, mouth, throat, pancreas, stomach, trachea, lungs, and bronchi. If nobody smoked, one of every three cancer deaths in the United States would not happen.

Although smoking increases your risk of almost all cancers, it directly accounts for about 85-90 percent of lung cancer cases, or nearly 9 out of 10 lung cancers are caused by smoking cigarettes. Smokeless tobacco (such as chewing tobacco and snuff) also increases the risk of cancer, especially oral cancers. More people in the United States, both men and women, die from lung cancer than any other type of cancer. Although the risks of smoking are more clear today than in 1964, smokers have a greater risk for lung cancer today than they did in 1964, even though they smoke fewer cigarettes.

Quitting smoking lowers the risks for cancers of the lung, mouth, throat, esophagus, and larynx.

- Within 5 years of quitting, your chance of getting cancer of the mouth, throat, esophagus, and bladder is cut in half.
- Ten years after you quit smoking, your risk of dying from lung cancer drops by half.

Smoking and Cardiovascular Disease

In addition to cancer, smoking causes lung diseases such as chronic bronchitis and emphysema, and increases the risk of heart disease, including stroke, heart attack, vascular disease, and aneurysm. One out of every four deaths from Cardiovascular Disease is caused by a person choosing to smoke.

Smoking can:

- Raise triglycerides (a type of fat in your blood)
- Lower “good” cholesterol (HDL)
- Make blood sticky and more likely to clot, which can block blood flow to the heart and brainDamage cells that line the blood vessels
- Increase the buildup of plaque (fat, cholesterol, calcium, and other substances) in blood vessels
- Cause thickening and narrowing of blood vessels

Secondhand Smoke and CVD

Nonsmokers exposed to secondhand smoke at home or work increase their risk of developing heart disease by 25-30 percent and lung cancer by 20-30 percent. Non-smokers exposed to secondhand smoke may experience coughing, overproduction of phlegm, reduced lung function and respiratory infections, including pneumonia and bronchitis. Breathing secondhand smoke can interfere with the normal functioning of the heart, blood, and vascular systems in ways that increase your risk of having a heart attack. Even briefly breathing secondhand smoke can damage the lining of blood vessels and cause your blood to become stickier. These changes can cause a deadly heart attack.

Each year about 150,000 – 300,000 children younger than 18 months old experience respiratory tract infections caused by secondhand smoke. Children exposed to secondhand smoke are at an increased risk of ear infections, severe asthma, respiratory infections and death. In fact, more than 100,000 babies have died in the past 50 years from sudden infant death syndrome (SIDS), and other health complications as a result of parental smoking. Children who grow up with parents who smoke are more likely to become smokers, thus placing themselves (and their future families) at risk for the same health problems as their parents when they become adults.

There is no safe level of exposure to tobacco smoke.

Smoking and Your Brain

Cigarettes and other forms of tobacco—including cigars, pipe tobacco, snuff, and chewing tobacco—contain the addictive drug **nicotine**. Nicotine is readily absorbed into the bloodstream when a tobacco product is chewed, inhaled, or smoked. A typical smoker will take 10 puffs on a cigarette over the period of about 5 minutes that the cigarette is lit. Thus, a person who smokes about 1 pack (25 cigarettes) daily gets 250 “hits” of nicotine each day.

Upon entering the bloodstream, nicotine immediately stimulates the adrenal glands to release the hormone epinephrine (adrenaline). Epinephrine stimulates the central nervous system and increases blood pressure, respiration, and heart rate.

Similar to other addictive drugs like cocaine and heroin, nicotine increases levels of the neurotransmitter dopamine, which affects the brain pathways that control reward and pleasure. For many tobacco users, long-term brain changes induced by continued nicotine exposure result in addiction—a condition of compulsive drug seeking and use, even in the face of negative consequences. Studies suggest that additional compounds in tobacco smoke, such as acetaldehyde, may enhance nicotine’s effects on the brain.

When an addicted user tries to quit, he or she experiences withdrawal symptoms including irritability, attention difficulties, sleep disturbances, increased appetite, and powerful cravings for tobacco. Treatments can help smokers manage these symptoms and improve the likelihood of successfully quitting.

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1.7.5: Quitting Smoking

Although quitting can be difficult, the health benefits of smoking cessation are immediate and substantial—including reduced risk for cancers, heart disease, and stroke.

What are the benefits of quitting smoking?

You will see immediate positive health improvements upon the cessation of smoking these include:

- Within 20 minutes, your heart rate and blood pressure drop.
- 12 hours, the carbon monoxide level in your blood drops to normal.
- 2-12 weeks, your circulation improves and your lung function increases.
- 1-9 months, coughing and shortness of breath decrease.
- 1 year, your risk of coronary heart disease is about half that of a smoker's.
- 5 years, your stroke risk is reduced to that of a nonsmoker 5 to 15 years after quitting.
- 10 years, your risk of lung cancer falls to about half that of a smoker and your risk of cancer of the mouth, throat, esophagus, bladder, cervix, and pancreas decreases.
- 15 years, the risk of coronary heart disease is that of a nonsmoker's.

In addition, people who quit smoking will have an improved sense of smell, and food will taste better.

How does quitting smoking impact life expectancy?

Data from the U.S. National Health Interview Survey show that people who quit smoking, regardless of their age, are less likely to die from smoking-related illness than those who continue to smoke. Smokers who quit before age 40 reduced their chance of dying prematurely from smoking-related diseases by about 90 percent, and those who quit by age 45-54 reduced their chance of dying prematurely by about two-thirds.

People who quit smoking, regardless of their age, have substantial gains in life expectancy compared with those who continue to smoke. Those who quit between the ages of 25 and 34 years lived about 10 years longer; those who quit between ages 35 and 44 lived about 9 years longer; those who quit between ages 45 and 54 lived about 6 years longer; and those who quit between ages 55 and 64 lived about 4 years longer.

Does quitting smoking lower the risk of cancer?

Yes. Quitting smoking reduces the risk of developing and dying from cancer. Although it is never too late to get a benefit from quitting, the benefit is strongest among those who quit at a younger age.

The risk of premature death and the chance of developing cancer from smoking depend on many factors, including the number of years a person smokes, the number of cigarettes he or she smokes per day, the age at which he or she began smoking, and whether or not he or she was already ill at the time of quitting. For people who have already developed cancer, quitting smoking reduces the risk of developing a second cancer.

Should someone already diagnosed with cancer bother to quit smoking?

Yes. Cigarette smoking has a profound adverse impact on health outcomes in cancer patients. For patients with some cancers, quitting smoking at the time of diagnosis may reduce the risk of dying by 30 percent to 40 percent. For those having surgery, chemotherapy, or other treatments, quitting smoking helps improve the body's ability to heal and respond to therapy. It also lowers the risk of pneumonia and respiratory failure. Moreover, quitting smoking may lower the risk of the cancer returning, of dying from the cancer, of a second cancer developing, and of dying from other causes.

Treatments for Tobacco Addiction

Tobacco addiction is a chronic disease that often requires multiple attempts to quit. Although some smokers are able to quit without help, many others need assistance. Both behavioral interventions (counseling) and medication can help smokers quit; but the combination of medication with counseling is more effective than either alone.

The U.S. Department of Health and Human Services' (HHS) has established a national toll-free quitline, 800-QUIT-NOW, to serve as an access point for any smoker seeking information and assistance in quitting. NIDA's scientists are looking at ways to make smoking cessation easier by developing tools to make behavioral support available over the internet or through text-based messaging. In addition, NIDA is developing strategies designed to help vulnerable or hard-to-reach populations quit smoking.

Behavioral Treatments

Behavioral treatments employ a variety of methods to help smokers quit, ranging from self-help materials to counseling. These interventions teach people to recognize high-risk situations and develop coping strategies to deal with them.

Nicotine Replacement Treatments

Nicotine replacement therapies (NRTs) were the first pharmacological treatments approved by the Food and Drug Administration (FDA) for use in smoking cessation therapy. Current FDA-approved NRT products include nicotine chewing gum, the nicotine transdermal patch, nasal sprays, inhalers, and lozenges. NRTs deliver a controlled dose of nicotine to a smoker in order to relieve withdrawal symptoms during the smoking cessation process. They are most successful when used in combination with behavioral treatments.

Other Medications

Bupropion and varenicline are two FDA-approved non-nicotine medications that have helped people quit smoking. Bupropion, a medication that goes by the trade name Zyban, was approved by the FDA in 1997, and Varenicline tartrate (trade name: Chantix) was approved in 2006. It targets nicotine receptors in the brain, easing withdrawal symptoms and blocking the effects of nicotine if people resume smoking.

Current Treatment Research

Scientists are currently developing new smoking cessation therapies. For example, they are working on a nicotine vaccine, which would block nicotine's reinforcing effects by causing the immune system to bind to nicotine in the bloodstream preventing it from reaching the brain. In addition, some medications already in use might work better if they are used together. Scientists are looking for ways to target several relapse symptoms at the same time—like withdrawal, craving and depression.

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1.7.6: End-of-Chapter Material

Key takeaways for this Chapter

- Both alcohol and tobacco increase your risk of disease
- A drink is considered 12-ounces of beer, 5-ounces of wine, or 1.5-ounces of 80-proof liquor
- BAC, Blood Alcohol Concentration, measures how much alcohol is in the blood.
- People should avoid binge drinking and heavy drinking.
- Nicotine is the drug in tobacco.
- Secondhand smoke is harmful to non-smokers.

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1.7.7: Alcohol and Tobacco- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

A brief history of alcohol



How caffeine and alcohol affect your sleep



How do cigarettes affect the body?



How does alcohol cause hangovers?



How does alcohol make you drunk?



The past, present and future of nicotine addiction

https://med.libretexts.org/@go/page/88009



What happened when the United States tried to ban alcohol



What you should know about vaping and e-cigarettes



You may be accidentally investing in cigarette companies



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SECTION OVERVIEW

1.8: Maximizing Your Nutrition

Learning Outcomes

By the end of this chapter you will be able to:

- Describe what food is made up of, including macronutrients and micronutrients
- Utilize food labels to determine the nutrition of foods.
- Explain what calories are and how foods provide calories
- Describe the Dietary Guidelines for Americans

What are you planning to eat today?

How do you decide what food you will eat today?

Do you think about what your food is made up of?

Have you considered how your food choices impact your health?

1.8.1: What is in the Food You Eat?

1.8.2: Types of Fats

1.8.3: Sodium

1.8.4: Carbohydrates (Starch, Fiber, and Sugar)

1.8.5: Proteins (Amino Acids)

1.8.6: Vitamins and Minerals

1.8.7: Nutrition Facts Label

1.8.8: The Dietary Guidelines For Americans

1.8.9: End-of-Chapter Material

1.8.10: Nutrition- Optional Continued Learning

The information in this chapter comes primarily from these key research and evidence based reports:

- The Dietary Guidelines for Americans, 2020-2025. 9th Edition[1].
- The MyPlate website. MyPlate is the current nutrition guide published by the USDA's Center for Nutrition Policy and Promotion.What's in the food you eat?

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1.8.1: What is in the Food You Eat?

STOP: Choose a Food

STOP! Before you go any further in this chapter, think about something you want to eat today.

Maybe you want to eat a burrito, or a burger, a salad, some soup, or maybe spaghetti?

1. Choose something you want to eat.
2. Find the nutrition label for the food you chose.
   - If the food you chose is something you bought at the grocery store it likely has a food label, or you may be able to view the food label through the grocery stores website. For example, Raley's grocery store provides images of the product including the food label (check out the Mott's Applesauce label on the Raley's website.
   - If you would like to get something from a restaurant you can usually find the food label online by either going to the restaurants website or searching for the item using online databases like CalorieKing, MyFitnessPal, Nutritionvalue.org, or try Food Data Central.
   - You might not be able to find the exact food item, do your best to find something close.
3. Take a moment to review the Interactive Nutrition Facts Label website to familiarize yourself with the information on the label.
4. Keep the nutrition information with you as you read this chapter!

Understanding Food Labels

Food labels are a tool to help us understand more about the foods we choose to eat. By understanding the nutrition of our food we can make better informed choices that contribute to our wellness. Nutrition labels have changed over time based on updated scientific information, new nutrition research, and input from the public. The most recent Food Label requirements were launched in 2016. Interested in seeing how the food label changed in 2016? Check out this comparison of the old and new label.



Figure 1.8.1.1: Check Food Labels

Ultimately, by having a standard way to show nutrition facts we are able to easily and quickly compare food choices to make informed decisions about the fuel we put into our body. Just like a car needs fuel to run, our bodies need food to provide us with energy.

Try this Nutrition Facts Pre-Test to see how much you already know about nutrition.

Servings

At the top of the food label you should see information about the number of servings and the size of the servings. The data provided on the food label is based on the serving size listed on the label. It is important to first identify how many servings you are consuming. If you are consuming two servings then you will need to multiple the data on the nutrition label by two.

The serving size on a nutrition label is based on the amount of food that is typically eaten at one time and is not a recommendation of how much to eat. Many people found that that servings sizes on the old food labels, prior to 2016, were unrealistic. For example, a 12 ounce can of Coke used to be 1.5 servings and has now been adjusted to being 1 serving.

Your food label: Servings

Evaluate the serving size and number of servings on your food label. How many servings do you eat? Did the serving size surprise you?

Calories

The next item on the food label is the amount of calories in the food. Calories refer to how much energy the food provides. Our bodies need energy (calories) to keep us alive and our organs functioning normally. When we eat and drink, we put energy (calories) into our bodies, and we use that energy in many ways, for example to keep our heart beating, to breathe, to digest food, to move throughout the day, to exercise, or to participate in sports.

Although the term calorie is the term commonly used, it actually refers to a kilocalorie. One (1) kilocalorie is the same as one (1) calorie (upper case C). In technical terms, a kilocalorie is the amount of heat required to raise the temperature of 1 kilogram of water one degree celsius.

When looking at the amount of calories on your food label, it is important to recognize the amount of calories in the food you are eating compared to how many calories you should consume each day. Look at the very bottom of the food label and you should see an asterisk with a statement similar to “2,000 calories a day is used as a general guide for nutrition advice.” Although 2,000 calories is used, the total number of calories you need each day varies depending on a number of factors including your age, sex, height, weight, level of physical activity, and pregnancy or lactation status. The total number of calories you should consume may also be determined by whether would like to lose, maintain, or gain weight affects how many calories should be consumed.

Use the MyPlate Plan to calculate how many calories you should consume each day.

As you look at the calories on your food label compared to your recommended daily caloric intake, be mindful of your energy balance. Energy balance refers to the balance of calories consumed through eating and drinking compared to calories burned through daily activities and physical activity. If we consume more calories (energy) than we use throughout the day, we store that energy for use at a later time as body fat. If we consume less calories (energy) than we use throughout the day, we utilize our stored body fat for energy.

Your Food Label: Calories

Evaluate the calories on your food label. How many calories does it contain? Is this considered a low or high calorie food? How much does this food item contribute to the total amount of calories you should consumer each day?

Use the MyPlate Plan to calculate how many calories you should consume each day and remember, if you are eating more than one serving you need to multiply the number of calories on the food label to see the total amount of calories consumed!

Nutrients

It is now time to learn about what your food is made up of, meaning what are the nutrients provided to your body when you consume the food. Nutrients are commonly divided into two categories, macronutrients and micronutrients. On the food label, the macronutrients are listed first followed by the micronutrients.

- Macronutrients: Carbohydrates, fats, proteins, and water.
- Micronutrients: Vitamins and minerals

When reviewing your food labels, you might notice some variation in the nutrients listed. The label must include total fat, saturated fat, trans fat, cholesterol, sodium, total carbohydrate, dietary fiber, total sugars, added sugars, protein, vitamin D, calcium, iron, and

potassium. The label might also include monounsaturated fat, polyunsaturated fat, soluble fiber, insoluble fiber, sugar alcohols, vitamins (biotin, choline, folate, niacin, pantothenic acid, riboflavin, thiamin, and vitamins A, B6, B12, C, E, and K) and minerals (chloride, chromium, copper, iodine, magnesium, manganese, molybdenum, phosphorus, selenium, and zinc).

Some nutrients are essential and some are considered nonessential. Essential nutrients are nutrients that must be consumed through the foods we eat, the body cannot synthesize the nutrients. Nonessential nutrients are nutrients that the body can synthesize, so they do not need to be consumed from food.

Three essential nutrients provide energy (calories), these are fats, carbohydrates, proteins. Alcohol also provides energy (calories), but is not considered an essential nutrient. The other nutrients do not directly provide calories, but they do aid in the production and utilization of energy by the body.

% Daily Value

For each nutrient, you will see the % Daily Value (%DV). This percentage is very helpful for understanding how the food contributes to the recommended total amount you should consume. it is important to note that the % Daily Value does not add up to 100%, it is not telling you the breakdown of the item, but rather how much the food item contributes to what you should consume each day. For example if you notice that the %DV for sodium is 50% this would mean the food you are eating contributes to half of your daily total for sodium. %DV makes it easy for you to compare foods.

An easy way to use %DV is to determine if a serving of the food is high or low in an individual nutrient. As a general guide:

- 5% DV or less of a nutrient per serving is considered low.
- 20% DV or more of a nutrient per serving is considered high.

The %DV for each nutrient is calculated by comparing the nutrient to the Dietary Reference Intakes (DRIs). The DRIs represent the most current scientific knowledge on nutrient needs of healthy populations. Some DRI's are listed as a specific amounts, such as number of grams, and others are based on the energy they provide in relation to your entire diet. The Acceptable Macronutrient Distribution Ranges (AMDRs) helps you to determine the amount of fats, proteins, and carbohydrates you should consume based on a percentage of your total calories.

Acceptable Macronutrient Distribution Ranges (AMDRs)

- Carbohydrates: Consume 45-65% of your calories from carbohydrates
- Fats: Consume 20-35% of your calories from fats
- Protein: Consume 10-35% of your calories from protein

Fat (lipids) and Cholesterol

The first nutrients on the food label are fats and cholesterol. Fats are also called lipids. We need both fats and cholesterol, however too much of both can negatively impact health.

We need fats in our diet for many reasons. First, fats provide us with energy. For every gram of fat you consume, you are provided with 9 calories of energy. Fat is considered a high-energy nutrient. Fat also provides us with long term energy storage, so if we do not consume enough energy our body can burn out stored body fat. Our body needs fat for other basic bodily function such as the synthesis of cell membranes, for growth and development, healthy skin and hair, blood clotting, nervous system function, reproduction, immune response, and to absorb important fat-soluble vitamins (vitamins A, D, E, and K). Fats also make food taste really good and help you feel full. Fat is found in foods from both plants and animals.

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1.8.2: Types of Fats

As you can see on the food label, there are a few different kinds of fats. The foods you eat might have saturated fats, unsaturated fats, or trans fats.

- **Saturated fat**
  - Found in higher proportions in animal products.
  - Usually solid at room temperature.
  - Commonly found in: animal fats, baked goods, condiments, gravies, dairy products (whole and 2% reduced-fat), desserts, meats and poultry and processed meats and poultry products, pizza, salad dressings, sandwiches, snack foods, spreads, sweets, tropical plant oils, and vegetable shortening.
- **Trans fat**
  - Trans fats can be either natural or artificial.
    - Small amounts of trans fats are found in dairy products, beef, and lamb.
    - Artificial trans fats are typically found in products that have hydrogenated oils. If you see hydrogenated vegetable oil in the ingredients list, this means there are trans fats. Although originally deemed safe, it was found that trans fats have detrimental effects on health and as of 2018 most trans fats have been removed from foods. Artificial trans fats were primarily found in a variety of foods, such as baked goods, coffee creamer, ready-to use frostings, snack foods, and stick margarine.
- **Unsaturated fat**
  - On the food label you will see unsaturated fats in two categories: Monounsaturated and polyunsaturated fats.
  - Found in higher proportions in plants
  - Usually liquid at room temperature, such as oils.
  - Commonly found in: avocados, fish, mayonnaise and oil-based salad dressings, nuts, olives, seeds, soft margarines, and vegetable oils.

Good and Bad Fats: Impact to Cholesterol

To understand whether a fat is considered good or bad we have to first understand what cholesterol is. Although cholesterol is commonly referred to negatively, it is not always bad for you. Our body, specifically our liver, produces cholesterol because we need it for cell membranes and to aid in the synthesis of substances that are vital for our health including steroid hormones, bile acids, and vitamin D.

If you go to the doctor and get your cholesterol tested your doctor will give you three different numbers: Total cholesterol, high density lipoprotein (HDL), and low density lipoprotein (LDL). Lipoproteins transport cholesterol in the body. The difference between HDL and LDL is the action of the lipoprotein. LDL's take cholesterol from the liver and transport it to tissues. HDL's do the opposite by transporting cholesterol from tissues to the liver, they are sometimes referred to as "reverse cholesterol transport". When you have a lot of LDLs taking cholesterol to tissues it can cause a build up of cholesterol on the walls of your blood vessels, which is bad, and can increase your risk of cardiovascular disease.

- Total cholesterol: A measure of the total amount of cholesterol in your blood. It includes both low-density lipoprotein (LDL) cholesterol and high-density lipoprotein (HDL) cholesterol.
- LDL (bad) cholesterol: The main source of cholesterol buildup and blockage in the arteries.
- HDL (good) cholesterol: HDL helps remove cholesterol from your arteries

There is evidence that diets higher in saturated fat and trans fat are associated with increased levels of total cholesterol and/or low-density lipoprotein (LDL or "bad") cholesterol—which, in turn, are associated with an increased risk of developing cardiovascular disease. Cardiovascular disease is the leading cause of death in both men and women in the U.S.

According to the Dietary Guidelines for Americans, many foods that are higher in dietary cholesterol are generally higher in saturated fat—and diets higher in saturated fat are associated with an increased risk of developing cardiovascular disease, thus it is recommend to keep the intake of dietary cholesterol as low as possible while maintaining a healthy diet.

Because of the relationship of saturated fats and high LDL, the Dietary Guidelines for Americans recommend consuming less than 10% of calories per day from saturated fat.

Tips for Consuming fat

- Pay attention to the %DV of fats on the food label, especially for saturated and trans fats.
  - Note the total %DV for Fats which will help you meet the AMDR for fats which is to consume between 20-35% of your calories from Fats.
- Look for ways to replace saturated fat with unsaturated fats when possible and try to avoid artificial trans fat.
- Choose lean cuts of meats and poultry. Trim or drain fat from meats before or after cooking and remove poultry skin before eating.
- Try seafood and plant sources of protein (such as soy products and unsalted nuts and seeds) in place of some meats and poultry.
- Substitute fat-free or 1% low-fat dairy products and fortified plant-based beverages (such as soy, rice, and almond) for whole and 2% reduced-fat dairy products.
- Cook and bake with liquid oils (such as canola and olive oil) instead of solid fats (such as butter, lard, and shortening).
- Try baking, broiling, grilling, and steaming. These cooking methods do not add extra fat.
- Limit baked goods, desserts, fried fast foods, and snack foods.
- When eating out, ask which fats are being used to prepare your meal. You can also ask if nutrition information is available to help you make informed choices.



Figure 1.8.2.2: Avoid Trans Fats

Your Food Label: Fats

Evaluate the fats on your food label. What does the food label tell you about the fats you are consuming? Is this a high or low fat food? What types of fats are in the food item? Would you consider this to be a good source of fat? How much does this food item contribute to the AMDR for fat?

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1.8.3: Sodium

Although sodium and salt are often used interchangeably, sodium is a mineral found in salt. Sodium is an essential nutrient that the human body needs for many body processes, such as fluid balance, muscle contraction, and nervous system function. However, too much sodium increases your risk of developing high blood pressure, which can raise the risk of heart attacks, heart failure, stroke, kidney disease, and blindness.

Sodium comes from the foods we eat. It is estimated that most of the sodium a person consumes comes from packaged or prepared meals (i.e. restaurants and fast food). Sodium enhances the flavor of food and can also be used to cure meat or preserve food.

The Dietary Guidelines for Americans recommend limiting sodium intake to less than 2,300 mg per day—that's equal to about 1 teaspoon of salt! Most Americans eat about 3,400 milligrams (mg) of sodium per day, well exceeding the recommended limits for sodium in the diet.

Look at your food label and see whether the food you are eating is a high contributor (>20%DV) to your recommended daily limit or a low contributor (<5%DV).

Tips for Consuming Sodium

- Look for light, low sodium, reduced sodium, or no-salt-added versions of packaged foods.
- Prepare your own food when you can and limit packaged sauces and flavored products (such as rice and pasta mixes and instant noodles).
- Flavor foods with herbs and spices and no-salt seasoning blends instead of adding salt to foods when cooking, baking, and eating.
- Choose fresh meats, poultry, and seafood, rather than processed varieties. Also, check the package on fresh meats and poultry to see if salt water or saline has been added.
- Buy fresh, frozen (no sauce or seasoning), low sodium, or no-salt-added canned vegetables.
- Rinse sodium-containing canned foods, such as beans, tuna, and vegetables before eating.
- Try light or reduced sodium condiments, add oil and vinegar to salads rather than bottled dressings, and use only a small amount of seasoning from flavoring packets instead of the entire packet.
- Choose low sodium or no-salt-added nuts, seeds, and snack foods (such as chips and pretzels)—or have carrot or celery sticks instead.
- Consume smaller portions of foods and beverages that are higher in sodium or consume them less often.
- When eating out, ask that your meal be prepared without salt and request that sauces and salad dressings be served "on the side," then use less of them. You can also ask if nutrition information is available and then choose options that are lower in sodium.

Your Food Label: Sodium

Evaluate the Sodium on your food label. What does the food label tell you about the sodium you are consuming? Is this a high or low sodium food?

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1.8.4: Carbohydrates (Starch, Fiber, and Sugar)

Next on your food label is carbohydrates, commonly referred to as carbs. Carbohydrates are one of the main types of nutrients and they are the **most important** source of energy for your body.

For each gram of carbohydrate we consume we are provided with 4 calories (this is less than half of the calories provided by one gram of fat!). Carbs are the primary energy source for the body's cells, tissues, and organs (such as the brain and muscles).

When we eat carbohydrates our body breaks them down into glucose. Glucose then enters our blood stream and is readily available to provide energy to the body both to fuel the brain and nervous system and provide quick energy for exercising. If glucose in the blood (often called blood sugar) it is not immediately used it is stored in the liver and muscles for later use.

On your food label, you will see the total carbohydrate intake, which is further broken down into fiber and sugar intake. Carbohydrates are made up of three components: Fiber, Starch, and Sugars. Fiber and starch are considered complex carbs and sugar is a simple carb. Complex carbs have more nutrients than simple carbs and are better for your health. Complex carbs are higher in fiber, so they digest more slowly, and keep is feeling fuller longer.

Examples of Types of Carbohydrates in Foods[2]

- Simple Carbohydrates: Candy, carbonated beverages, corn syrup, fruit juice, honey, table sugar
- Complex Carbohydrates: Apples, broccoli, lentils, spinach, unrefined whole grains, brown rice
- Starches: Potatoes, chickpeas, pasta, and wheat.
- Fiber:
  - Insoluble: Brans, seeds, vegetables, brown rice, potato skins.
  - Soluble: Fleshy fruit, oats, broccoli, and dried beans.

The Role of Fiber in Your Health

We need fiber in our diet! Dietary fiber supports our bowel movements, lowers blood glucose and cholesterol levels, and reduces calorie intake. Unfortunately, more than 90 percent of women and 97 percent of men do not meet recommended intakes for dietary fiber. More than 85 percent of adults do not meet the recommended intake of fruits, vegetables, and whole grains which would provide them with fiber, and they eat a high amount of processed (refined) carbohydrates which reduce the natural fiber content.



Figure 1.8.4.3: Importance of Fiber

Refined (processed) vs. Unrefined Carbohydrates

Refined grains are foods that have been processed to remove parts of the grains, which then also removes some of the nutrients that are good for your health. For example, do you choose to eat white rice or brown rice? White rice begins as brown rice and then it gets processed (refined) to remove the rice's husk, bran, and germ. When this happens, it removes important nutrients such as fiber, vitamins, and minerals, people sometimes refer to the refined carb as empty carbs or empty calories. The body processes refined carbs quickly, so they do not provide lasting energy, and they can cause a person's blood sugar to spike. Sometime the white rice is "enriched" whereby fiber, vitamins, and minerals are added back into the rice.

To increase your fiber intake, choose whole grains that have not been refined (processed). To figure out whether a product has a lot of whole grain, check the ingredients list on the package and see if a whole grain is one of the first few items listed.

Food Sources of Dietary Fiber

Soluble and Insoluble Fiber

Fiber is commonly classified as soluble, which dissolves in water, or insoluble, which doesn't dissolve. Soluble fiber dissolves in water to form a gel-like material. It can help lower blood cholesterol and glucose levels. Soluble fiber is found in oats, barley, nuts, seeds, beans, lentils, peas, and some fruits and vegetables. Insoluble fiber promotes the movement of material through your digestive system and adds bulk to the stool, so it can be of benefit to those who struggle with constipation or irregular stools. Insoluble fiber is found in foods such as wheat bran, vegetables, and whole grains.

The Role of Sugar in Your Health

When looking at the food label you will notice data for total sugar and added sugars. Including added sugars was a part of the update to the new Food labels, previous to this update only total sugar was included. The difference in the two numbers is the source of the sugar, whether it is a naturally occurring sugar or sugar that has been added. Most Americans exceed the recommended limits for added sugars in the diet. There is evidence that diets low in sugar are associated with a reduced risk of developing cardiovascular disease and diets higher in all sugars can increase the risk of developing cavities.

Natural Sugar vs. Added Sugar

Sugars naturally present in food include:

- Dairy products (such as milk and yogurt)
- Fruit (fresh, frozen, dried, and canned in 100% fruit juice)
- 100% fruit and vegetable juice
- Vegetables

Added sugars include:

- Baked goods (such as cakes, cookies, pastries, and pies)
- Desserts (such as ice cream and puddings)
- Salad dressings, sauces, spreads, condiments, and gravies
- Sugar-sweetened beverages (such as energy drinks, fruit drinks, soft drinks, sports drinks, and sweetened coffee and tea)
- Sweets (such as candies, jams, sweet toppings, and syrups)
- Single-ingredient sugars (such as table sugar, maple syrup, or honey)

Reflection: How much sugar do you consume?

How many teaspoons of sugar would you need to scoop into a glass to equal the amount of sugar in a Frappuccino?

- A grande Caramel Frappuccino® Blended Beverage has 54 grams of sugar.
- To help you solve this challenge, you first need to know that one teaspoon of sugar equals 4 grams of sugar.
- You would need to scoop 13.5 teaspoons of sugar into a glass to equal the amount of sugar in a grande Starbucks Frappuccino.

The *Dietary Guidelines for Americans* recommend limiting calories from added sugars to less than 10% of total calories per day. If you are on a 2,000 calorie diet this would mean less than 50 grams per day of added sugars per day, which is less than one Caramel Frappuccino from Starbucks.

Tips for Consuming Carbohydrates

- Use the food label to understand whether the food you are consuming is considered high or low based on %DV.
  - Note the total %DV for carbohydrates which will help you meet the AMDR for carbs which is to consume between 45-65% of your calories from Fats.
- Eat more whole grains (such as brown rice, bulgur, couscous, and quinoa) and choose whole grain versions of common carbohydrates such as breads, cereals, pasta, and rice.
- Look for options that are lower in added sugars, saturated fats, and/or sodium, such as: bread instead of croissants; English muffins instead of biscuits; and plain popcorn instead of buttered.
- Choose whole fruit (fresh, frozen, dried, and canned in 100% fruit juice) as snacks and desserts and use fruit to top foods like cereal, yogurt, oatmeal, and pancakes.
- Keep raw, cut-up vegetables handy for quick snacks—choose colorful dark green, orange, and red vegetables (such as broccoli florets, carrots, and red peppers).

- Add beans and peas or unsalted nuts and seeds to salads, soups, and side dishes. These are also great sources of dietary fiber and protein.
- Try unsweetened or no-sugar added versions of fruit sauces (such as applesauce) and plain, fat-free or 1% low-fat yogurt.
- More often, choose beverages such as water and fat-free or 1% low-fat milk. Less often, choose beverages that are high in calories but have few or no beneficial nutrients, such as energy drinks, fruit drinks, soft drinks, and sports drinks.
- Consume smaller portions of foods and beverages that are higher in added sugars or consume them less often.

Your Food Label: Carbohydrates

Evaluate the carbohydrates on your food label. What does the food label tell you about the carbs you are consuming? Is this a high or low carb food? What types of carbs are in the food item and are they processed/refined? Would you consider this to be a good source of carbs? How much does this food item contribute to the AMDR for carbs?

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1.8.5: Proteins (Amino Acids)

Our bodies need protein from the foods we eat to provide us with energy (calories) and to build, maintain, and repair, bones, muscles and skin. Protein is a component of every cell in the human body, found in almost all body fluids, and is important for many body processes, such as blood clotting, fluid balance, immune response, vision, and production of hormones, antibodies, and enzymes. Most Americans get the recommended amounts of protein to meet their needs.

Like Carbohydrates, proteins provide us with four calories of energy per gram consumed. Protein is found in both plant and animals foods. We commonly get proteins in our diet from meat, dairy products, nuts, and certain grains and beans.

Proteins are made up of amino acids. There are 20 different amino acids that that can be combined to make every type of protein in the body. Imagine each Amino Acid was a Lego piece and by combining various amino acids together you make different proteins. Of the 20 amino acids, nine of them are considered essential, meaning we need to bring them into our body through the food we eat. The other 11 amino acids are called non-essential because our body can produce them, so we don't need to consume them in our diet. A protein that contains all nine essential amino acids is called a Complete Protein. Most complete proteins come from animal sources, such as dairy products, eggs, meats, poultry, seafood, and soy is a plant-based complete protein source. Incomplete proteins are either missing one or more of the nine essential proteins or do not contain enough of one of them. Most plant foods such as beans, grains, nuts, peas, seeds, and vegetables are incomplete protein sources. Foods can be combined together to provide all nine essential amino acids, this is called complementary proteins. For example, grains are low in the amino acid lysine, while beans and nuts (legumes) are low in the amino acid methionine. When grains and legumes are eaten together (such as rice and beans or peanut butter on whole wheat bread), they form a complete protein.

Tips for Consuming Protein

- **The Daily Value for protein is 50 g per day.** This is based on a 2,000 calorie daily diet—your Daily Value may be higher or lower depending on your calorie needs. Look at your food label to see whether the food you are eating is high or low in protein by looking at the %DV.
  - Note the total %DV for proteins which will help you meet the AMDR for proteins which is to consume between 10-35% of your calories from proteins.
- Choose a variety of protein, such as beans and peas, eggs, fat-free or 1% low-fat dairy products, lean meats and poultry, seafood, soy products, and unsalted nuts and seeds.
- Choose seafood and plant sources of protein (such as beans and peas, tofu and other soy products, and unsalted nuts and seeds) in place of some meats and poultry.
- Add beans and peas to salads, soups, and side dishes—or serve them as a main dish.
- Substitute fat-free or 1% low-fat dairy products and fortified plant-based beverages (such as soy, rice, and almond) for whole and 2% reduced-fat dairy products.
- Select fresh meats, poultry, and seafood, rather than processed varieties.
- Trim or drain fat from meats before or after cooking and remove poultry skin before eating.
- Try baking, broiling, grilling, or steaming. These cooking methods do not add extra fat

Your Food Label: Protein

Evaluate the proteins on your food label. What does the food label tell you about the protein you are consuming? Is this a high or low protein food? What types of protein are in the food item, plant or animal sources? Would you consider this to be a good source of protein? How much does this food item contribute to the AMDR for protein?

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1.8.6: Vitamins and Minerals

At the bottom of the food label you will see select vitamins and minerals. Both vitamins and minerals are important for your health. The human body needs the right "mix" of nutrients for good health, each one has a different role in the health of the body. The majority of Americans get the recommended amounts of most vitamins and minerals to meet their needs. However, many people do not get the recommended amounts of vitamin D, calcium, iron, and potassium. These nutrients are considered "nutrients of public health concern" because low intakes are associated with potential health risks.

Vitamins are organic substances that are naturally present in many plant and animal products. Minerals are inorganic substances that are found naturally in soil and water. People obtain vitamins and minerals from both the plant and animal products they eat.

There are 14 vitamins and 14 minerals that may be included in the food label. These include:

- Vitamins
  - Vitamins C, A, D, E, K, and the B vitamins (thiamine, riboflavin, niacin, pantothenic acid, biotin, B_6, B_{12}, and folate)
    - Vitamin C and the B Vitamins are called water-soluble vitamins
    - Vitamins A, D, E, and K are called fat-soluble vitamins.
    - Most vitamins are essential and must be acquired through the foods we eat. The body can make a few vitamins such as Vitamins D, Choline, and Biotin.
- Minerals
  - Calcium, chloride, chromium, copper, iodine, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, sodium, and zinc.

Many people do not consume enough vitamin D, calcium, iron, and potassium. Review the common sources of food to help you increase your daily intake:

- Food Sources of calcium
- Food Sources of potassium
- Food Sources of Vitamin D
- Food Sources of Iron

Tips for Consuming Vitamins and Minerals

- Look at your food label to understand how the food you are eating are providing you with vitamins and minerals, especially focusing on Vitamin D, Iron, Calcium, and Potassium. What percentage of your Daily Value does the food provide?
- Eat a variety of colorful vegetables (such as fresh, frozen, canned, and dried) and 100% vegetable juices. Buy frozen (without butter or sauce) and low sodium or no-salt-added canned vegetables. Try vegetables as snacks, salads, side dishes, and as part of main dishes.
- Focus on whole fruits (such as fresh, frozen, dried, and canned in 100% fruit juice). Try fruits as snacks and desserts and add fruits to salads, side dishes, and to top foods like cereal, pancakes, and yogurt.
- Make at least half your grains whole grains. Look for foods with a whole grain listed as the first or second grain ingredient after water. Try whole grains (such as brown rice, couscous, and quinoa) as side dishes and switch from refined to whole grain versions of commonly consumed foods (such as breads, cereals, pasta, and rice).
- Vary your protein routine. Try beans and peas, fat-free or 1% low-fat dairy products, eggs, lean meats and poultry, seafood, soy products, nuts, and seeds. Choose seafood and plant sources of protein (such as beans and soy products) in place of some meats and poultry. Add beans or peas to salads, soups, and side dishes and try unsalted nuts or seeds as snacks.
- Substitute fat-free or 1% low-fat dairy products and fortified plant-based beverages (such as soy, rice, and almond) for whole and 2% reduced-fat dairy products.

Your Food Label: Vitamins and Minerals

Evaluate the vitamins and minerals on your food label. What does the food label tell you about the vitamins and minerals you are consuming? Does this food item contribute a lot or a little of the essential vitamins and minerals? What types of vitamins and minerals are in the food item? Would you consider this to be a good source of vitamins and minerals ?

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1.8.7: Nutrition Facts Label

Ingredient Lists, Water, Antioxidants, and Food Labels

Food labels can help you understand what is in the foods and beverages you choose. In addition to the Nutrition Facts label, the ingredient list can provide helpful clues about added sugars, whole grains, fats, and how processed a food may be.

The goal is not to label foods as “good” or “bad,” but to build awareness and make choices that support your overall eating pattern, health needs, culture, preferences, and budget.

Ingredient List

The ingredient list is usually found near the Nutrition Facts label. Looking at the ingredients is a helpful way to understand what is in the food you are eating.

Ingredients are listed in descending order by weight. This means the first ingredients are present in the largest amounts. For example, if sugar is listed as one of the first ingredients, the food may be higher in added sugar. If you are looking for more whole grains, look for words such as **whole grain**, **whole wheat**, or **whole oat** near the beginning of the ingredient list.

If the first ingredients include added sugars, refined grains, or hydrogenated oils, the product may be more highly processed and less nutrient-dense. This does not mean one food determines your overall health, but it can help you compare options and make informed choices.

Label Reading Tip: Added sugars can appear under many different names.

Learning to recognize these names can help you better understand the amount and type of sweeteners in packaged foods and beverages.

Common Names for Added Sugars

Types of sugar: beet sugar, brown sugar, cane sugar, caster sugar, coconut sugar, date sugar, golden sugar, invert sugar, muscovado sugar, raw sugar, evaporated cane juice, and confectioner's sugar.

Types of syrup: carob syrup, golden syrup, high-fructose corn syrup, honey, agave nectar, malt syrup, maple syrup, oat syrup, rice syrup, and rice bran syrup.

Other added sugars: barley malt, molasses, cane juice crystals, corn sweetener, crystalline fructose, dextran, malt powder, fructose, fruit juice concentrate, glucose, maltodextrin, and maltose.

Your Food Label: Ingredient List

Use the ingredient list on your food label to answer the questions below.

- What are the first five ingredients listed?
- Because ingredients are listed from most to least, what do the first few ingredients tell you about the food item?
- Do you see whole grains, added sugars, refined grains, hydrogenated oils, or other ingredients you recognize?
- Are there ingredients listed that you are not familiar with? If so, look them up using a credible source.

Water

Water is not listed on the Nutrition Facts label, but it is essential for health. Water helps regulate body temperature, supports digestion, transports nutrients, supports kidney function, and helps maintain normal body processes.

Hydration needs vary based on age, body size, activity level, climate, health status, pregnancy or breastfeeding status, and the types of foods and beverages a person consumes. Some foods, especially fruits, vegetables, soups, and other high-water foods, also contribute to total fluid intake.

General total water intake recommendations include water from beverages and foods. The Institute of Medicine established adequate intake levels of about 3.7 liters per day for adult men and about 2.7 liters per day for adult women. Individual needs may be higher or lower.

> **Hydration Tip:** Plain water is usually the best everyday beverage choice.
>
> Choosing water more often instead of sugar-sweetened beverages can support hydration while reducing added sugar intake.

Antioxidants

Antioxidants are substances that may help protect cells from damage related to oxidative stress. Examples include vitamin C, vitamin E, selenium, and carotenoids such as beta-carotene, lycopene, lutein, and zeaxanthin.

Vegetables, fruits, nuts, seeds, legumes, and whole grains contain antioxidants and many other beneficial compounds. Diets rich in fruits and vegetables are associated with lower risk for many chronic diseases.

It is important to understand that antioxidants from whole foods are not the same as antioxidant supplements. Research has not consistently shown that antioxidant supplements prevent chronic disease, and some high-dose supplements may be harmful for certain people. For most people, the best approach is to get antioxidants through a varied eating pattern that includes many plant-based foods.

Organic and Bioengineered Foods

Along with reviewing the food label on packages, you may also see statements such as “organic,” “made with organic ingredients,” “bioengineered,” or “Non-GMO.” It is helpful to understand what these statements mean.

Organic Labeling

Organic labeling refers to how a food was produced. Organic products must follow agricultural practices that support resource cycling, ecological balance, soil and water quality, limited use of synthetic materials, and biodiversity.

Organic does not automatically mean a food is more nutritious or healthier. For example, organic cookies are still cookies. The label tells you about production practices, not whether the food is nutrient-dense.

Four Organic Label Categories

100 Percent Organic: Used for products that contain 100% organic ingredients, excluding salt and water.

Organic: Used for products that contain at least 95% organic ingredients, excluding salt and water.

Made with Organic _____: Used for products that contain at least 70% organically produced ingredients, excluding salt and water.

Specific Organic Ingredients: Products with less than 70% organic content may identify specific organic ingredients in the ingredient list.

Bioengineered Foods

The terms “bioengineered,” “genetically modified organism,” “GMO,” and “genetic engineering” are often used interchangeably in everyday language and marketing. Under U.S. law, the term used for disclosure is **bioengineered**.

The National Bioengineered Food Disclosure Standard defines bioengineered foods as foods that contain detectable genetic material that has been modified through certain laboratory techniques and cannot be created through conventional breeding or found in nature.

Current scientific evidence indicates that approved bioengineered foods on the market are considered safe to eat. However, some consumers may still choose foods based on personal values, environmental concerns, farming practices, or preference. Reading labels can help consumers make informed choices.

Mini Self-Check

Which statement best reflects current food label guidance?

▼ A. If a food has a long ingredient list, it is automatically unhealthy.

> Not necessarily. A long ingredient list may suggest more processing, but it is better to look at the overall nutrition profile, ingredients, and how often the food is eaten.

▼ B. Ingredient lists can help identify added sugars, whole grains, and types of fats.

> Correct. Ingredient lists are useful tools for understanding what is in a food and comparing similar products.

▼ C. Organic always means a food is more nutritious.

> Organic labeling describes production practices. It does not automatically mean a food is more nutrient-dense.

Explore Current Sources

- FDA: Added Sugars on the Nutrition Facts Label
- USDA MyPlate Food Group Gallery
- USDA Organic Labeling
- USDA Bioengineered Food Disclosure Standard

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1.8.8: The Dietary Guidelines For Americans

Dietary Patterns and Nutrient Density

The Dietary Guidelines for Americans, 2025–2030 provide evidence-informed recommendations designed to support health and reduce risk for chronic disease across the lifespan. Current nutrition guidance focuses less on single foods and more on overall eating patterns developed over time.

Healthy eating patterns can look different for different individuals and families. Culture, traditions, food access, schedules, preferences, and budget all influence food choices and eating behaviors.

Key Vocabulary

Dietary Pattern: The combination of foods and beverages that make up a person's eating habits over time.

Nutrient-Dense Foods: Foods and beverages that provide vitamins, minerals, fiber, protein, and other beneficial nutrients while containing relatively low amounts of added sugars, saturated fats, and sodium.

Major Dietary Guideline Goals

1. Follow a Healthy Dietary Pattern at Every Life Stage

Healthy eating patterns are important from infancy through older adulthood. It is never too early or too late to make changes that support long-term health.

2. Customize Nutrition Choices

Healthy eating patterns should reflect personal preferences, cultural traditions, food access, schedules, and budget considerations. There is no single “perfect” way to eat that works for everyone.

3. Focus on Real, Nutrient-Dense Foods and Beverages

Nutritional needs should primarily be met through foods and beverages that provide beneficial nutrients with limited added sugars, saturated fats, and sodium.

Examples of nutrient-dense foods include:

- vegetables of all types
- whole fruits
- whole grains
- beans, peas, and lentils
- nuts and seeds
- seafood
- lean meats and poultry
- eggs
- plain yogurt, milk, or fortified soy alternatives
- healthy plant oils, such as olive oil

4. Limit Added Sugars, Saturated Fat, Sodium, and Highly Processed Foods

Current dietary guidance encourages people to limit foods and beverages high in added sugars, saturated fats, and sodium. The 2025–2030 guidelines also place greater emphasis on choosing real, minimally processed foods more often.

- Added sugars: limit foods and beverages high in added sugars
- Saturated fat: generally keep saturated fat below 10% of total daily calories
- Sodium: less than 2,300 milligrams per day for most adults and teens
- Alcohol: consuming less alcohol is better for overall health

Click each item to explore the difference between nutrient-dense and less nutrient-dense choices.

▼ Whole fruit vs. fruit-flavored candy

Whole fruit provides fiber, vitamins, minerals, and water. Fruit-flavored candy contains large amounts of added sugar with far fewer beneficial nutrients.

▼ Brown rice vs. refined white rice products

Whole grains generally contain more fiber and nutrients than refined grains because less of the grain has been removed during processing.

▼ Water vs. sugar-sweetened soda

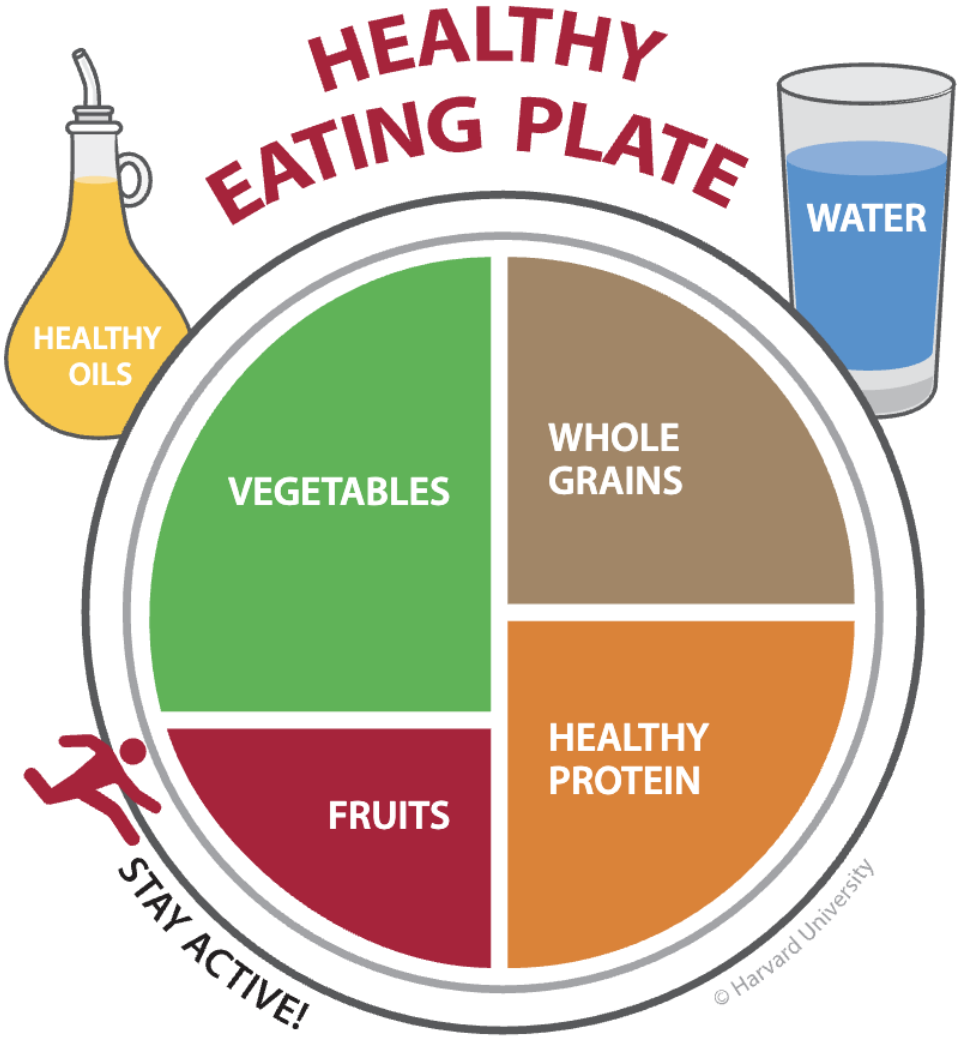
Water hydrates the body without added sugar. Frequent intake of sugar-sweetened beverages is associated with increased risk for obesity, type 2 diabetes, and dental disease.

▼ Nuts and seeds vs. heavily processed snack foods

Nuts and seeds provide healthy fats, protein, minerals, and fiber. Many highly processed snack foods contain large amounts of sodium, refined starches, and added fats.

Current Nutrition Guidance

Current public health nutrition guidance increasingly focuses on improving overall dietary patterns rather than labeling individual foods as strictly “good” or “bad.” Many evidence-informed nutrition models emphasize similar long-term habits, including eating more vegetables and fruits, choosing whole grains, including healthy protein foods, drinking water, and limiting highly processed foods.



Healthy Eating Plate



Eat Real Food

Common Themes Across Current Nutrition Guidance

- eat a variety of colorful vegetables and fruits
- choose whole grains more often than refined grains
- include healthy protein foods such as beans, seafood, nuts, eggs, tofu, poultry, and lean meats
- choose healthy fats from foods such as olive oil, nuts, seeds, avocados, and seafood
- choose water and unsweetened beverages for hydration
- limit foods and beverages high in added sugars, saturated fats, and sodium
- limit highly processed foods and refined carbohydrates
- make choices that fit culture, preferences, access, schedule, and budget

Important Reminder: Healthy eating patterns are not about perfection or labeling foods as “good” or “bad.”

Nutrition choices are influenced by food access, culture, time, family routines, marketing, and economic factors. Public health nutrition focuses on supporting realistic, sustainable, and balanced eating patterns across the lifespan.

Mini Self-Check

Which statement best reflects current dietary guideline recommendations?

▼ A. Nutrition is mainly about counting calories.

Calories matter, but current dietary guidelines emphasize overall dietary patterns, nutrient density, food quality, and long-term eating habits.

▼ B. Healthy eating patterns can be adapted to culture, preferences, and budget.

Correct. Current dietary guidelines emphasize flexibility and recognize that healthy eating patterns can look different across individuals and cultures.

▼ C. All processed foods should be completely avoided.

Current nutrition research focuses more on overall dietary patterns and limiting many highly processed foods rather than expecting complete

elimination of all processed foods.

Explore Current Sources

- Dietary Guidelines for Americans, 2025–2030
- RealFood.gov
- Harvard Healthy Eating Plate

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1.8.9: End-of-Chapter Material

Key Takeaways for this Chapter

- Energy from food:
  - Carbohydrates: Four calories/gram
    - 45-65% of total calories should come from carbs
  - Fats (lipids): Nine calories/gram
    - 20-35% of total calories should come from fats
  - Protein: Four calories/gram
    - 10-35% of total calories should come from protein
  - Water: contains 0 calories/gram
  - Alcohol: Seven calories/gram
- Macronutrients: Carbohydrates, fats, proteins
- Micronutrients: Vitamins and minerals
- General healthy eating tips
  - Eat nutrient dense foods
    - Avoid refined/processed foods
  - Increase your fiber intake
  - Reduce sugar intake
  - Reduce saturated fats

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1.8.10: Nutrition- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

How do carbohydrates impact your health?



How does the thyroid manage your metabolism?



How quinoa can help combat hunger and malnutrition



How the food you eat affects your gut



Should we eat bugs?



The ingredient in almost everything you eat



The many reasons to eat a plant-based diet



What foods did your ancestors love?



What is a calorie?



What is fat?



Why dieting doesn’t usually work



Why healthy bones are about so much more than milk



Why you don’t need 8 glasses of water a day



Why you shouldn’t worry about pooping once a day



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SECTION OVERVIEW

1.9: Maintaining a Healthy Weight

Learning Objectives

By the end of this chapter you will be able to:

- Recognize the role fat plays in health and disease
- Compare and contrast the use of BMI and body composition measurements
- Describe negative health consequences of obesity and overweight
- Explain the difference between type 1 and type 2 diabetes
- Identify actions that could be implemented to reduce obesity
- Recognize the signs of body dysmorphic disorders and eating disorders

How much of your body weight comes from your bones, muscles, organs, or body fat?

Have you ever tried a diet to lose weight?

Are there differences in health outcomes based on where you store body fat?

1.9.1: Introduction to Weight Management

1.9.2: Negative Health Implications of Obesity

1.9.3: Assessing Body Composition

1.9.4: Factors Contributing to Obesity

1.9.5: Weight Loss Strategies

1.9.6: Body Image, Eating Disorders, and Low Body Weight

1.9.7: End-of-Chapter Material

1.9.8: Healthy Weight- Optional Continued Learning

The information in this chapter comes primarily from the following websites:

- The Center for Disease Control- Overweight and Obesity
- The World Health Organization- Obesity and Overweight

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1.9.1: Introduction to Weight Management

It is highly likely that you have seen weight loss ads in the newspaper, magazines, or in your social media feed. With about 50% of the U.S. population saying they tried to lose weight in the last 12 months[1], it is not surprising that the weight loss industry is estimated to be a $3 billion dollar industry.

Although this chapter will address those who are underweight, the predominance of information will relate to persons who are overweight or obese. Overweight and obesity are linked to more deaths worldwide than underweight; most of the world's population live in countries where overweight and obesity kills more people than underweight. In the U.S., an estimated 1.5% of adults aged 20 and over are underweight[2], compared to about 42% of adults who are considered obese. The goal is to strive for a healthy weight since persons who are underweight or overweight have negative health implications.

This chapter focuses on body weight and body composition. Both body weight and body composition are important measurements to understand your health. Body weight is typically measured in pounds or kilograms and is simply your body's total mass. Body composition is what your weight is made of (muscle, bone, water, and fat) and is typically measured as a percentage. For example, a person might have a body weight of 200 lbs and a percentage body fat of 25%, in this example, 50lbs of their body weight comes from fat. Although body weight is the measurement most commonly used to assess the health of our body size, body composition is a more accurate look at our body size by understanding what the body is made up of. It is quick and easy to step on a scale and measure your body weight, but measuring body composition is much more challenging, thus body weight is the standard used to address overweight and obesity.

Fat is not bad, we need fat for healthy cellular function, energy, cushioning for vital organs, insulation, long term energy storage, and absorption of fat-soluble vitamins. The minimum about of body fat needed by males is about 3% and females is about 12%. It is generally accepted that an overall range of 10-22 percent for men and 20-32 percent for women is considered satisfactory for good health. This necessary body fat for health is considered essential body fat. When the body stores additional body fat above the essential amount it is called non-essential body fat. A woman's essential fat range is naturally greater than a man's because of fat deposits in breasts, uterus and sex-specific sites.

The Calorie Balance Equation and Metabolism

In the Nutrition Chapter, you were introduced to the energy (calorie) balance equation, which simply means to compare energy in versus energy out, or how many calories we are eating each day compared to the amount of calories we expend. If a persons consumes an excess of 3,500 calories that is the equivalent of gaining one pound of weight. That means if you reduce your daily calorie intake by 500 calories or burn 500 more calories each day than you consume, you may be able to lose a pound a week. Caloric expenditure is most often associated with exercise, however most of our daily caloric expenditure is to maintain bodily functions, like breathing, circulating our blood, and digesting food.

The term used to describe the chemical processes in the body that convert calories into energy is metabolism. Your body needs a minimum number of calories to sustain these functions. Basal metabolic rate (BMR) and Resting metabolic rate (RMR) are measurements used to estimate how many calories your body burns when you're not exercising. These two measurements are often used interchangeably, however they do have a slight difference. A BMR measurement is slightly more accurate because it is measured when you are doing nothing, just upon waking up, while laying down in a dark room after sleeping for for at least eight hours and fasting for 12 hours. RMR is taking without the strict conditions of the BMR; BMR is usually slightly lower than your RMR. Both basal metabolic rate (BMR) and resting metabolic rate (RMR) measure the amount of energy *(C*alories) that your body needs to stay alive and function properly. It is helpful to understand your BMR/RMR since it accounts for about 60-80% of total energy expenditure each day. Your BMR/RMR is effected by your weight, height, age, gender, and genetics. A key component of your weight that impacts BMR/RMR is the amount of muscle you have; muscle mass increases BMR/RMR.

Defining Overweight and Obese

The measurement used across the world to identify if a person is overweight or obese is called the Body Mass Index (BMI), which is based on a persons weight versus their height. BMI is used because it is an inexpensive and easy screening method to identify weight categories (underweight, healthy weight, overweight, and obesity). It is important to recognize that BMI does not assess body composition or body fatness, it is simply a measurement of body size and is used as a screening tool. Although it may not be accurate for some of the population, for example athletes with high muscle mass, it has been shown to be correlated to other more accurate measures of body fatness and to various weight related diseases.

BMI is a person's weight in kilograms divided by the square of height in meters:

BMI= weight (kg) / [height (m)]2

Table (\PageIndex{1}\): BMI Indicators

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Healthy Weight
25.0 – 29.9	Overweight
30.0 and Above	Obesity

Table (\PageIndex{2}\): BMI Example for person who is 5'9″

Height	Weight Range	BMI	Weight Status
5'9″	124 lbs or less	Below 18.5	Underweight
5'9″	125 lbs to 168 lbs	18.5 to 24.9	Healthy Weight
5'9″	169 lbs to 202 lbs	25.0 to 29.9	Overweight
5'9″	203 lbs or more	30 or higher	Obesity

As noted previously, BMI is the most commonly used tool to assess health weight, but for many people it is not an accurate measurement because it does not assess your body composition. For example, two people can have the exact same height and weight, thus the same BMI, but one could be a professional athlete who is very active with low body fat and the other could be sedentary with high body fat. Using the example in Table (\PageIndex{2}\) , a person who is 5'9″ and 203 pounds is considered obese using the BMI, it does not matter whether that person is a 203 pound professional weight lifter or a sedentary person with high body fat.

Recently, the American Medical Association (AMA) highlighted the limitations of BMI, emphasizing its inability to consider variations across race/ethnic groups, sexes, genders, and age groups. The report acknowledged that BMI is an imperfect measure of body fat and discussed its associated harms and benefits. In response to these findings, the new policy aims to educate physicians about the issues related to BMI and advocates for alternative measures in diagnosing obesity.

Under the newly adopted policy in 2024, the AMA acknowledges the historical harm and racist exclusion associated with BMI. The policy recognizes that BMI is primarily based on data from non-Hispanic white populations of previous generations. Due to significant limitations in using BMI alone in clinical settings, the AMA recommends its use in conjunction with other valid measures of risk, including but not limited to, visceral fat, body adiposity index, body composition, relative fat mass, waist circumference, and genetic/metabolic factors.

The policy emphasizes that while BMI is correlated with fat mass in the general population, its predictability diminishes when applied on an individual level. The AMA also underscores the importance of considering relative body shape and composition differences across various demographic groups when using BMI as a measure of adiposity. Additionally, the policy advises against using BMI as the sole criterion for denying insurance reimbursement. The overarching goal is to encourage a more comprehensive and nuanced approach to assessing and addressing health risks associated with obesity.

Also, extremely muscular individuals are often quite metabolically healthy despite having BMIs on the upper end of the spectrum. Other methods of measuring body fat, like DEXA, or Dual-energy X-ray absorptiometry scans, may be more suitable than BMI. However, these alternative methods can be more challenging to obtain and interpret in clinical practice, as they require more time and training and/or special equipment.

Activity: What is your Body Mass Index?

There are many BMI calculators available online to quickly calculate your BMI.

Take a minute and go to the CDC's Adult BMI Calculator and enter your height and weight.

Evaluate your BMI results:

- Are you considered underweight, healthy weight, overweight, and obese?
- Does the BMI result seem accurate for you and your body composition?

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1.9.2: Negative Health Implications of Obesity

People who have obesity, compared to those with a normal or healthy weight, are at increased risk for many serious diseases and health conditions, including the following:

- All-causes of death (mortality)
- High blood pressure (Hypertension)
- High LDL cholesterol, low HDL cholesterol, or high levels of triglycerides (Dyslipidemia)
- Type 2 diabetes
- Coronary heart disease
- Stroke
- Gallbladder disease
- Osteoarthritis (a breakdown of cartilage and bone within a joint)
- Sleep apnea and breathing problems
- Many types of cancer
- Low quality of life
- Mental illness such as clinical depression, anxiety, and other mental disorders4
- Body pain and difficulty with physical functioning

Understanding Diabetes

As you learned at the beginning of this chapter, the body breaks down the food we eat to turn it into energy, this process is called metabolism. The disease that affects how your body turns food into energy is called Diabetes. There are three main types of diabetes: type 1, type 2, and gestational diabetes (diabetes while pregnant). More than 122 million Americans are living with diabetes (37.3 million, 11.3% of the US population) or prediabetes (96 million, 38.0% of the adult US population).

When discussing diabetes you will often hear people talk about Insulin. Most of the food you eat is broken down into sugar (also called glucose) and released into your bloodstream. When your blood sugar goes up, it signals your pancreas to release insulin. Insulin acts like a key to let the blood sugar into your body's cells for use as energy. Without insulin, blood sugar can't get into cells causing the blood sugar to build up in the bloodstream. High amounts of blood sugar are damaging to the body and causes many of the symptoms and complications of diabetes.

If you have type 1 diabetes, your pancreas doesn't make insulin or makes very little insulin. Approximately 5-10% of the people who have diabetes have type 1. Type 1 Diabetes is usually diagnosed in children, teens, and young adults. Type 1 diabetes is thought to be caused by an autoimmune reaction (the body attacks itself by mistake) that stops your body from making insulin.

If you have type 2 diabetes, your cells don't respond normally to insulin. About 90-95% of people with diabetes have type 2. It develops over many years and is usually diagnosed in adults (but more and more in children, teens, and young adults). Type 2 diabetes can be prevented or delayed with healthy lifestyle changes, such as losing weight, eating healthy food, and being active.

You're at risk for developing type 2 diabetes if you:

- Have prediabetes
- Are overweight
- Are 45 years or older
- Have a parent, brother, or sister with type 2 diabetes
- Are physically active less than 3 times a week
- Have ever had gestational diabetes (diabetes during pregnancy) or given birth to a baby who weighed more than 9 pounds
- Are African American, Hispanic/Latino American, American Indian, or Alaska Native (some Pacific Islanders and Asian Americans are also at higher risk)

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1.9.3: Assessing Body Composition

As noted previously, BMI is the measurement used as a screening tool to quickly and inexpensively identify whether a person is at a healthy weight, is underweight, overweight, or obese. BMI is not a measure of body composition, it will not tell you whether you are overfat, it will only tell you whether you are overweight. Understanding what the body is made up of (muscle, bone, water, and fat) is a better predictor of health, however the tools used to measure body composition can be expensive, intrusive, not widely available, or difficult to standardize across observers or machines. Due to the challenges with measuring body composition, BMI is considered the best method.

When evaluating body composition, there are two general types of evaluations, body fat distribution and body fat percentage.

Body Fat Distribution

Fat is stored as subcutaneous fat, which is fat stored just under the skin, and visceral fat, which is fat stored deeper in the body around the organs. We are all different and one difference we have is where we store body fat. Body fat distribution, meaning where a person stores their fat, has health implications. Visceral fat tends to be store around the abdomen and research indicates high amounts of visceral fat lead to negative health implications including all-cause mortality[5].

One method for evaluating body composition is to look in the mirror at the outline of the body. People are often described as being either apple shaped, carrying body fat around the abdomen, or pear shaped, carry body fat around the hips. People who are apple-shaped, thus carrying excess visceral fat around the abdomen, are at higher risk of developing health issues.

Besides looking in the mirror, body fat distribution can be measured by calculating a person waist circumference, waist-to-hip ratio, and waist-to-height ratio.

- Waist Circumference
  - Stand and place a tape measure around your middle, just above your hipbones. Measure your waist in inches just after you breathe out
    - Your waistline may be telling you that you have a higher risk of developing obesity-related conditions if you are
      - A man whose waist circumference is more than 40 inches
      - A non-pregnant woman whose waist circumference is more than 35 inches
- Waist-to-Hip Ratio
  - You can calculate your waist-to-hip ratio by taking your waist circumference and dividing it by your hip circumference. The World Health Organization categorizes high risk as a ratio above 0.85 for women and more than 0.9 for men.
- Waist-to-Height Ratio (WHtR)
  - You can calculate your waist-to-height ratio by dividing your waist circumference by your height. A waist-to-height ratio of more than 0.5 may put you at higher risk for heart disease and diabetes. Waist-to-height ratio has been shown to be a good predictor of both BF% and Visceral Fat mass in men and women[6].

Body Fat Percentage

Body fat percentage is attempting to measure the percentage of your body that is fat-free mass versus fat mass. There are several measurement tools to estimate body fat percentage, each have pros and cons mostly related to difficulty, cost, and availability.

- Bioelectrical Impedance Analysis (BIA)
  - Bioelectrical Impedance Analysis is likely the measuring method you are most familiar with. Have you ever used a scale that told you your body fat percentage? If so, you have used BIA. BIA devices emit a low-level electrical current through the body and measure the amount of resistance the current encounters. Based on the level of impedance, a pre-programed equation is used to estimate body fat percentage. Fat-tissue contains little water, making it a poor conductor of electricity; whereas, lean tissue contains mostly water and electrolytes, making it an excellent conductor. The most accurate BIA devices use electrodes on the feet and hands to administer the point-to-point electrical current. Because BIA devices primarily measure hydration, circumstances that may influence hydration status at the time of measurement must be taken into account. Recent exercise, bladder content, hydration habits, and meal timing can cause wide measurement variations and influence accuracy. However, this method is generally inexpensive, often portable, and requires limited training to use, making it a very practical option.
- Skinfold Calipers

- Skinfold analysis is a widely used method of assessing body composition because of its simplicity, portability, and affordability. Some call the skinfold test the “pinch test” because the skin and underlying subcutaneous fat is pinched with calipers to measure the thickness. The assumption of skinfold measurement is that the amount of subcutaneous fat is proportionate to overall body fat. These numbers are plugged into an equation to generate an estimate of body fat percentage. The skinfold test is fairly accurate when administered properly.

- Hydrostatic Weighing (underwater weighing)
  - Hydrostatic weighing is a difficult process, but has long been considered the “gold standard” for assessing body composition. A person is weighed when dry and then enters a water tank and is weighed while underwater. Since fat is less dense than muscle tissue, a person with more body fat will weigh less in the water than a similar person with more lean mass. Using the measurements, the density can be determined and converted into body fat percentage. With a small margin of error (around 1-2%) this method is very accurate. Unfortunately, the expense and practicality of building and maintaining a water tank limits access for most. This method is also challenging for people who are afraid of water, don’t feel comfortable in bathing suits, or would be fearful of exhaling all air and sitting underwater without moving for a short time.
- Air Displacement (Plethysmography)
  - Plethysmogography works similarly to hydrostatic weighing however measures the displacement of air instead of water. The Bod Pod is most commonly referenced machine. During the test, a person sits in a chamber that varies the air pressure allowing for body volume to be assessed. Air displacement provides a viable alternative for those with a fear of water. Like many other methods, the expense, availability, and training of personnel Air Displacement requires limit accessibility. Additionally, its accuracy is slightly less than underwater weighing.
- Dual X-ray Absorptiometry (DXA)
  - Replacing underwater weighing as the new “gold standard,” DXA provides a quick and pain free method for measuring body fat by scanning the body. The patient lays down and is scanned by the DXA machine which takes about 6 minutes. Major disadvantages to this method are its high cost and the need for a welltrained professional to operate the equipment and analyze the results.

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1.9.4: Factors Contributing to Obesity

Although weight is often simplified to the calorie balance equation, it is much more complicated than just the amount of energy consumed versus expended. There are many factors that contribute to overweight and obesity. Some factors can be changed, such as unhealthy lifestyle habits and environments, and others cannot be changed, such as age, family history and genetics, race and ethnicity, and sex.

Unhealthy Lifestyle Factors

We make healthy and unhealthy choices everyday and many of those choices impact our likelihood of becoming overweight or obese. These include: Lack of physical activity, unhealthy eating patterns, not enough sleep, and high amounts of stress.

- Lack of physical activity
  - Lack of physical activity increases your risk of obesity and type 2 diabetes. Strong scientific evidence shows that physical activity helps people maintain a stable weight over time and can reduce the risk of excessive weight gain and the incidence of obesity.
  - Healthy lifestyle changes, such as being physically active and reducing screen time, can help you aim for a healthy weight.
- Unhealthy eating behaviors
  - Some unhealthy eating behaviors can increase your risk for overweight and obesity.
    - Eating more calories than you use.
    - Eating too much saturated and trans fats
    - Eating foods high in added sugars
    - Not eating enough fiber
- Not enough sleep
  - Many studies have seen a high BMI in people who do not get enough sleep. Some studies have seen a relationship between sleep and the way our bodies use nutrients for energy and how lack of sleep can affect hormones that control hunger urges.
- High amounts of stress
  - Acute stress and chronic stress affect the brain and trigger the production of hormones, such as cortisol, that control our energy balances and hunger urges. Acute stress can trigger hormone changes that make you not want to eat. If the stress becomes chronic, hormone changes can make you eat more and store more fat.

Environmental Factors

Geography, food availability, transportation, and work environments are environmental factors that can increase your risk for overweight and obesity[7].

- Geography
  - Where you live may impact your risk of obesity. In the U.S. the South and the Midwest having the highest level of obesity among adults. There is also an increase in BMI in rural areas that is which is said to be contributing to approximately 55% of global increases in BMI. The increase of BMI in rural areas may be due to having farther distances between residences and supermarkets, clinical settings, and recreational opportunities.
- Food Availability
  - The food that is available in your community may impact your risk of obesity. Historical data has shown a relationship between the amount of fast food available in a community and the rate of obesity. The lack of affordable healthy food is termed a “food desert.” Communities that have been designated as a “food desert” have higher rates of obesity. The ease and availability of high sugar drinks, large portion sizes, and highly processed snack foods all relate to increased risk of obesity.
- Transportation
  - How your community is designed may impact your risk of obesity. A neighborhood purposefully developed to allow for people to be able to walk instead of drive reduces your risk of obesity; High neighborhood walkability has been found to be associated with decreased prevalence of overweight and obesity. Neighborhoods that provide recreational facilities, access to sidewalks and paths that remove pedestrians from traffic hazards, and access to parks, have all been reported to be facilitators of physical activity.
- Work Environment and Advances with Technology

- Have you considered how jobs have changed with the advances in technology? From 1960 to 2010, jobs in the U.S. private industry shifted from 50% requiring at least moderate to vigorous physical activity to less than 20% requiring this level of activity intensity[8]. National Health and Nutrition Examination Survey data has documented an association between decreases in work-related energy expenditure and weight gain over the same time period. The changes in energy expenditure may be due to advances in technology, an easy example is the use of email to quickly transmit documents rather than walking them to a colleague.

Individual Factors

Although environmental factors have been shown to impact obesity rates, people can have the same environmental factors and still have variances in obesity, fat distribution, and health issues. Thus, it is important to understand how individual characteristics, such as their genetics, impact their risk of obesity.

- Race or Ethnicity
  - Some racial and ethnic minority groups are more likely to have obesity. Rates of obesity in American adults are highest in blacks, followed by Hispanics, then whites. This is true for men or women. While Asian men and women have the lowest rates of unhealthy BMIs, they may have high amounts of unhealthy fat in the abdomen, which as an increase risk for cardiovascular disease and diabetes. Samoans may be at risk for overweight and obesity because they may carry a DNA variant that is associated with increased BMI.
- Sex
  - In the United States, obesity is more common in black or Hispanic women than in black or Hispanic men.
  - A person's sex may also affect the way the body stores fat. For example, men store more unhealthy fat around the abdomen than women.
  - Overweight and obesity is also common in women with polycystic ovary syndrome (PCOS). This is an endocrine condition that causes large ovaries and prevents proper ovulation, which can reduce fertility.
- Age
  - Many people gain weight as they age. The risk of unhealthy weight gain increases as you age. Adults who have a healthy BMI often start to gain weight in young adulthood and continue to gain weight until 60 to 65 years old, when they tend to start losing weight.
  - Childhood obesity remains a serious problem in the United States and children who have obesity are more likely to have obesity as adults.
- Genetic Influences
  - The relationships of genetics to obesity has been studied for over 100 years. Although over 50 genes have been shown to have an association with obesity, in most obese people, no single genetic cause can be identified. In a study comparing identical and fraternal twins who either grew up together or apart showed that their genetics was more substantially related to their BMI than the environment that they grew up in[9]. Most obesity seems to be multifactorial, that is, the result of complex interactions among many genes and environmental factors.
  - Recent research has been focusing on u
- Medical Conditions
  - Several genetic syndromes are associated with overweight and obesity, including Prader-Willi syndrome, Bardet-Biedl syndrome, Alström syndrome, and Cohen syndrome
  - Endocrine disorders, such as hypothyroidism and cushing's syndrome also impact overweight and obesity.
  - Medical problems, such as arthritis, also can lead to decreased activity, which may result in weight gain.
- Medicines
  - Some medications can lead to weight gain, these include: antipsychotics, antidepressants, antiepileptics, and antihyperglycemics.

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1.9.5: Weight Loss Strategies

We know that a majority of our population should implement strategies to lose weight and we know over 50% of Americans have indicated they would like to lose weight. The Dietary Guidelines for Americans and the Physical Activity Guidelines for Americans provide numerous tips for adjusting diet and exercise to support a health weight, these were explained in Chapters 2 and 3 of this textbook.

Here are additional strategies for weight loss:

Commit to a Weight Loss Plan

As you learned in chapter 1, setting goals is important for behavior change.

- Make a commitment to lose weight.
  - Explain your "why" for wanting to lose weight
- Take stock of where you are
  - Take time to assess your current health and lifestyle.
  - Record a food and exercise diary for one week and review the diary to help you recognize the changes you could make to help you lose weight.
  - The Body Weight Planner is a helpful tool for assisting you in making a personalized calorie and physical activity plans to reach your goal weight within a specific time period and to maintain it afterwards.
- Make SMART goals
- Find resources, tools, information, or support that can help you successfully reach your goals.
- Record your progress and acknowledge or reward your hardwork.

How to assess safe and effective weight loss programs

Would you like additional help and support that may be provided by a structured weight loss program? With so many different weight loss programs, it may be difficult to choose which program is right for you.

Begin by talking with your healthcare provider. Share your concern regarding your weight and ask if they can refer you to a weight loss program or specialist.

When reviewing weight loss programs, look for ones that are not just focused on eating a specific food, but rather take more of a holistic view of your overall health and lifestyle habits.

According to the National Institute of Diabetes and Digestive and Kidney Disease, a safe and successful weight-loss programs should include:

- behavioral treatment, also called lifestyle counseling, that can teach you how to develop and stick with healthier eating and physical activity habits—for example, keeping food and activity records or journals.
- information about getting enough sleep, managing stress, and the benefits and drawbacks of weight-loss medicines.
- ongoing feedback, monitoring, and support throughout the program, either in person, by phone, online, or through a combination of these approaches.
- slow and steady weight-loss goals—usually 1 to 2 pounds per week (though weight loss may be faster at the start of a program).
- a plan for keeping the weight off, including goal setting, self-checks such as keeping a food journal, and counseling support.

If you would prefer an online program, it should include:

- organized, weekly lessons, offered online or by podcast, and tailored to your personal goals.
- support from a qualified staff person to meet your goals.
- a plan to track your progress on changing your lifestyle habits, such as healthy eating and physical activity, using tools such as cellphones, activity counters, and online journals.
- regular feedback on your goals, progress, and results provided by a counselor through email, phone, or text messages.
- the option of social support from a group through bulletin boards, chat rooms, or online meetings.

Avoid weight-loss programs that make any of the following promises:

- Lose weight without diet or exercise!

- Lose weight while eating as much as you want of all your favorite foods!
- Lose 30 pounds in 30 days!
- Lose weight in specific problem areas of your body!
- Other warning signs to look out for include
  - very small print, asterisks, and footnotes, which may make it easy to miss important information.
  - before-and-after photos that seem too good to be true.
  - personal endorsements that may be made up.

Dietary Approaches to Weight loss

Tips for healthy eating include:

- Emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products
- Include a variety of protein foods such as seafood, lean meats and poultry, eggs, legumes (beans and peas), soy products, nuts, and seeds.
- Reduce saturated fats, trans fats, cholesterol, salt (sodium), and added sugars
- Stay within your daily calorie needs
  - Replace some higher calorie foods with foods that are lower in calories *and* fill you up.
  - Choose smaller portion sizes. Research shows that people unintentionally consume more calories when faced with larger portions.
    - If eating out where there are large portion sizes, take half of your meal home.
  - When eating a salad, dip your fork into dressing instead of pouring lots of dressing on the salad.
  - When eating out, substitute a broth-based soup or a green lettuce salad for French fries or chips as a side dish.
  - Add more vegetables such as cucumbers, lettuce, tomato, and onions to a sandwich instead of extra meat or cheese.
- Rethink your drink and drink more water
  - Carry a water bottle with you and refill it throughout the day.
  - Freeze some freezer safe water bottles. Take one with you for ice-cold water all day long.
  - Choose water over sugary drinks.
  - Opt for water when eating out. You'll save money and reduce calories.
  - Serve water during meals.
  - Add a wedge of lime or lemon to your water. This can help improve the taste and help you drink more water than you usually do.
- Plan your meals
  - Since high-calorie foods are everywhere, it's important to take the time to plan ahead to make sure you have healthy options available.
  - Check the restaurant menu and plan your meal ahead of time.
  - Write down everything you eat and drink. It keeps you accountable to yourself!
- Have healthy snacks ready
  - "Grab-and-go" fruits: apples, oranges, bananas, canned fruit without added sugars, and raisins
  - Washed and chopped fresh vegetables: celery, carrots, and cucumbers
  - Low-fat and fat-free milk products: yogurt without added sugars, milk, and low-fat cheeses
  - Whole-grain crackers and breads
  - Protein choices such as low-fat deli turkey slices or almonds and other nuts and seeds

When eating your favorite comfort foods:

- Eat them less often. If you normally eat these foods every day, cut back to once a week or once a month.
- Eat smaller amounts. If your favorite higher-calorie food is a chocolate bar, have a smaller size or only half a bar.
- Try a lower-calorie version. Use lower-calorie ingredients or prepare food differently. For example, if your macaroni and cheese recipe includes whole milk, butter, and full-fat cheese, try remaking it with non-fat milk, less butter, low-fat cheese, fresh spinach and tomatoes. Just remember to not increase your portion size.

Diets

The Dietary Guidelines for Americans stresses the importance of developing a healthy eating pattern. For some people, it can be helpful to follow a specific diet. If you are interested in following a diet it is important to recognize that even if a particular diet may be successful for one person, it may not be effective for another due to individual differences in genes and lifestyle. Harvard School of Public Health provides detailed reviews of the following diets for your consideration:

- Anti-Inflammatory Diet
- DASH Diet
- Gluten-Free for Weight Loss
- Intermittent Fasting for Weight Loss
- Ketogenic Diet for Weight Loss
- Mediterranean Diet
- Mindful Eating
- Paleo Diet for Weight Loss

Bariatric Surgery

Weight-loss surgery, also known as bariatric surgery, is an operation that makes changes to the digestive system. In the United States, surgeons most often perform three types of operations: gastric sleeve, gastric bypass, and adjustable gastric band. Bariatric surgery may be an option if you have extreme obesity (over 40 BMI) or are at lower levels of obesity (over 30 BMI) but you have serious health problems, such as type 2 diabetes or sleep apnea, related to obesity. Bariatric surgery can improve many of the medical conditions linked to obesity, especially type 2 diabetes. Side effects of the surgery may include bleeding, infection, leaking from the surgery site, diarrhea, and blood clots.

A longitudinal study of bariatric surgery (gastic bypass and gastric band) was conducted to understand immediate and long term effects[10]. The study included people who had bariatric surgery between 2005-2009. Researchers met with the participants before surgery, 30 days after, 6 months after, and then annually until 2015.

Thirty days after bariatric surgery, researchers found that

- Death rates were low. Only 2.1 percent of participants who had open gastric bypass and 0.2 percent of participants who had laparoscopic gastric bypass died. No participants who had gastric band surgery died.
- Only 4.1 percent of participants had at least one major bad outcome, such as death, development of blood clots, repeat surgeries, or failure to be released from the hospital.
- No significant differences in complication risk were found based on the type of gastric bypass procedure.
- Participants with the highest BMI values had the greatest risk of complications.
- Participants with a history of deep vein blood clots or sleep apnea had a higher risk of complications.

At the 7-year follow-up, LABS researchers found that

- Participants lost an average of 28.4 percent of their body weight after gastric bypass surgery and 14.9 percent of their body weight after laparoscopic gastric band surgery.
- Most participants maintained their weight loss. Three to 7 years after surgery, participants who had gastric bypass surgery regained an average of 3.9 percent of their body weight, and participants who had gastric band surgery regained on average of 1.4 percent of their body weight.
- High cholesterol was less common after gastric bypass and gastric band surgery.
- Diabetes and high blood pressure were less common after gastric bypass surgery. Over time, diabetes reoccurred in some patients, but numbers of new cases were low.
- Alcohol use disorders increased after gastric bypass surgery but not after gastric band surgery.
- Pain and physical function improved after bariatric surgery.

Weight Loss Drugs

1. *Appetite Suppressants:* These drugs help control hunger signals, making it easier to stick to a reduced-calorie diet.
2. *Fat Absorption Inhibitors:* These medications limit the body's ability to absorb dietary fats, reducing overall calorie intake.
3. *Metabolism Boosters:* Some drugs aim to increase metabolism, encouraging the body to burn more calories.

How Weight Loss Drugs Work: Weight loss drugs target different aspects of the weight loss process. Appetite suppressants influence the brain's hunger signals, fat absorption inhibitors reduce calorie absorption, and metabolism boosters increase energy expenditure.

Criteria for Prescription: Weight loss drugs are typically prescribed for individuals with a body mass index (BMI) over 30 or those with a BMI over 27 with weight-related health issues. A healthcare professional assesses the individual's overall health and risk factors before prescribing these medications.

Potential Benefits and Risks:

- *Benefits:* Weight loss drugs may lead to modest weight loss, improved metabolic health, and a reduced risk of obesity-related conditions.
- *Risks:* Side effects can vary, and some medications may pose risks if not used under proper medical supervision. Common side effects include nausea, dry mouth, or constipation.

Lifestyle Changes: For optimal results, weight loss drugs should be combined with lifestyle modifications. A balanced diet and regular physical activity significantly contribute to long-term success.

Consultation with Healthcare Professionals: Before considering weight loss drugs, it's crucial to consult with a healthcare professional. They can evaluate your health, discuss potential risks, and provide personalized advice tailored to your needs.

Cautionary Note: Avoid using unregulated weight loss supplements, as they may lack scientific validation and pose health risks.

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1.9.6: Body Image, Eating Disorders, and Low Body Weight

Body Image

When you look in the mirror, how do you see yourself and feel about your body (e.g., height, shape, and weight)? Your body image is what you think, feel, perceive, and behave regarding your body. Body image is a multidimensional concept that includes[11]:

- Cognitive: thoughts and beliefs about the body
- Perceptual: how people perceive the size and shape of their body and body parts
- Affective: feelings about the body
- Behavioral: the actions that people perform to check on, tend to, alter, or conceal their body

Factors effecting body image and body image disorders include: BMI, family, social pressures, media, social media, self esteem, chronic illness, depression, and sexual abuse.

A person with a positive body image has a clear and true perception of their body; seeing the various parts of your body as they really are. Body positivity (or body satisfaction) involves feeling comfortable and confident in your body, accepting your natural body shape and size, and recognizing that physical appearance say very little about one's character and value as a person.

A person with a negative body image or a distorted perception for their body, has feelings of shame, anxiety, and self-consciousness. People who experience high levels of body dissatisfaction feel their bodies are flawed in comparison to others, and they are more likely to suffer from feelings of depression, isolation, low self-esteem, and eating disorders.

Eating Disorders

While there is no single cause of eating disorders, research indicates that body dissatisfaction is the best-known contributor to the development of eating disorders and body dysmorphic disorder. Body dysmorphic disorder (BDD) is a distressing preoccupation or a markedly excessive concern with one or more perceived or slight defects in physical appearance, associated with significant distress and functional impairment.

Eating disorders are serious and often fatal illnesses that are associated with severe disturbances in people's eating behaviors and related thoughts and emotions. They are associated with a wide range of adverse psychological, physical, and social consequences. A person with an eating disorder may start out just eating smaller or larger amounts of food, but at some point, their urge to eat less or more spirals out of control. Severe distress or concern about body weight or shape, or extreme efforts to manage weight or food intake, also may characterize an eating disorder.

Eating disorders are real, treatable medical illnesses. They frequently coexist with other illnesses such as depression, substance abuse, or anxiety disorders. Other symptoms can become life-threatening if a person does not receive treatment, which is reflected by anorexia being associated with the highest mortality rate of any psychiatric disorder.

Anorexia Nervosa

Many people with anorexia nervosa see themselves as overweight, even when they are clearly underweight. Eating, food, and weight control become obsessions. People with anorexia nervosa typically weigh themselves repeatedly, portion food carefully, and eat very small quantities of only certain foods. Some people with anorexia nervosa also may engage in binge eating followed by extreme dieting, excessive exercise, self-induced vomiting, or misuse of laxatives, diuretics, or enemas.

Symptoms of anorexia nervosa include:

- Extremely low body weight
- Severe food restriction
- Relentless pursuit of thinness and unwillingness to maintain a normal or healthy weight
- Intense fear of gaining weight
- Distorted body image and self-esteem that is heavily influenced by perceptions of body weight and shape, or a denial of the seriousness of low body weight
- Lack of menstruation among girls and women.
- Some who have anorexia nervosa recover with treatment after only one episode. Others get well but have relapses. Still others have a more chronic, or long-lasting, form of anorexia nervosa, in which their health declines as they battle the illness.

Other symptoms and medical complications may develop over time, including:

- Thinning of the bones (osteopenia or osteoporosis)
- Brittle hair and nails
- Dry and yellowish skin
- Growth of fine hair all over the body (lanugo)
- Mild anemia, muscle wasting, and weakness
- Severe constipation
- Low blood pressure, or slowed breathing and pulse
- Damage to the structure and function of the heart
- Brain damage
- Multi-organ failure
- Drop in internal body temperature, causing a person to feel cold all the time
- Lethargy, sluggishness, or feeling tired all the time
- Infertility.

Bulimia Nervosa

People with bulimia nervosa have recurrent and frequent episodes of eating unusually large amounts of food and feel a lack of control over these episodes. This binge eating is followed by behavior that compensates for the overeating such as forced vomiting, excessive use of laxatives or diuretics, fasting, excessive exercise, or a combination of these behaviors.

Unlike anorexia nervosa, people with bulimia nervosa usually maintain what is considered a healthy or normal weight, while some are slightly overweight. But like people with anorexia nervosa, they often fear gaining weight, desperately want to lose weight, and are intensely unhappy with their body size and shape. Usually, bulimic behavior is done secretly because it is often accompanied by feelings of disgust or shame. The binge eating and purging cycle can happen anywhere from several times a week to many times a day.

Other symptoms include:

- Chronically inflamed and sore throat
- Swollen salivary glands in the neck and jaw area
- Worn tooth enamel, and increasingly sensitive and decaying teeth as a result of exposure to stomach acid
- Acid reflux disorder and other gastrointestinal problems
- Intestinal distress and irritation from laxative abuse
- Severe dehydration from purging of fluids
- Electrolyte imbalance—too low or too high levels of sodium, calcium, potassium, and other minerals that can lead to a heart attack or stroke.

Binge-Eating Disorder

People with binge-eating disorder lose control over their eating. Unlike bulimia nervosa, periods of binge eating are not followed by compensatory behaviors like purging, excessive exercise, or fasting. As a result, people with binge-eating disorder often are overweight or obese. People with binge-eating disorder who are obese are at higher risk for developing cardiovascular disease and high blood pressure. They also experience guilt, shame, and distress about their binge eating, which can lead to more binge eating.

Low Body Weight (underweight)

Because more people experience excess body fat, the focus up to this point has been on health concerns related to overweight and obesity. However, fat is an essential component to a healthy body and insufficient fat reserves can cause health issues. It is estimated that 1.6% of U.S. adults aged 20 and over are underweight. Poor nutrition or underlying health conditions can result in adults being underweight. A healthy body fat percentage for men is 10-22% body fat (minimum required is 3-5% fat) and women is 20-32% body fat (minimum required is 8-12%). Using a BMI, if your BMI is less than 18.5, it falls within the underweight range.

Persons who are underweight may experience:

- Osteoporosis
- Skin, hair, and teeth problems
- Immune System disorders (get sick more)
- Low energy (tired or fatigued all the time)
- Reproductive disorders: Irregular menstrual cycle and premature births

- Respiratory disorders
- Slow or impaired growth due to lack of nutrients
- Mental health issues such as Depression
- Increased mortality from external causes like accidents, injuries, and suicide[12]

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1.9.7: End-of-Chapter Material

Key takeaways from this Chapter

- Fat plays an important role in our health.
- BMI does not measure body composition or body fatness, it only measures body size.
- Obesity is caused by many factors including lifestyle habits/choices, environment, and individual factors, such as genetics.
- Having a healthy diet pattern and incorporating physical activity and exercise are important for a healthy weight.
- Both overweight/obesity and underweight have negative health implications

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1.9.8: Healthy Weight- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

Three ways community creates a healthy life



Enough with the fear of fat



Food Revolutionaries



Henna-Maria Uusitupa: How the gut microbes you’re born with affect your lifelong health



How an obese town lost a million pounds



Is the obesity crisis hiding a bigger problem?



Obesity + hunger = 1 global food issue



Teach every child about food

https://med.libretexts.org/@go/page/88029



The brain science of obesity



The inaccurate link between body ideals and health



What is obesity?



Why are eating disorders so hard to treat?



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SECTION OVERVIEW

1.10: Improving Your Fitness

Learning Outcomes

By the end of this chapter you will be able to:

- Describe the difference between Physical Activity, Exercise, and Physical Fitness.
- Explain the importance of physical activity and exercise for health.
- Identify ways to increase daily physical activity.
- Apply the components of the FITT principle to exercise program design.
- Calculate Target Heart Rate Zone.
- Recognize the importance of sleep.

How much of your day do you spend awake versus asleep?

Of your awake time, how much of your day is spent being active versus inactive?

Of the time you spend being active, how much of that time is your heart rate elevated?

How much of your day do you spend strengthening your muscles or stretching?

This chapter is focused on the time of the day you spend active versus inactive, specifically focusing on your physical activity, exercise, physical fitness, and sleep.

1.10.1: Physical Activity, Exercise, and Physical Fitness

1.10.2: Health Benefits of Physical Activity and Exercise

1.10.3: Increase both Physical Activity and Physical Fitness

1.10.4: Develop an Exercise Program to Build Your Physical Fitness

1.10.5: Guidance for your Current Level of Physical Activity

1.10.6: End-of-Chapter Material

1.10.7: Fitness- Optional Continued Learning

The information in this chapter comes primarily from three key research and evidence based reports:

1. The Physical Activity Guidelines for Americans 2nd edition[1]. Note this first edition was published in 2008 and the 2nd edition in 2018.
2. The WHO Guidelines on Physical Activity and Sedentary Behaviour[2]
3. The Global Action Plan on Physical Activity 2018-2030[3]

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1.10.1: Physical Activity, Exercise, and Physical Fitness

What is the difference between physical activity, exercise, and physical fitness?

Although often used interchangeably, the terms physical activity, exercise, and physical fitness have different meanings. In short, physical activity refers to any body movement, exercise is physical activity that is planned and structured to achieve physical fitness, and physical fitness refers to how well your heart, lungs, muscles, and joints respond to daily tasks. The detailed definitions[4] for each are:

- **Physical activity** is any form of bodily movement performed by skeletal muscles that result in an increase in energy expenditure.
  - Examples of physical activity:
    - Shopping
    - Cleaning your house
    - Gardening
    - Washing your car
    - Dancing
- **Exercise** is a form of physical activity that is planned, structured, repetitive, and performed with the goal of improving health or fitness. Exercise is purposeful to improve or maintain of one or more components of physical fitness. All exercise is physical activity, but not all physical activity is exercise.
  - Example of exercise:
    - Jog for 30 minutes
    - Swim 1 mile
    - Attend an aerobics class
    - Lift weights
- **Physical fitness** is a persons ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and respond to emergencies. A persons physical fitness is developed by incorporating an exercise routine that specifically develops the components of physical fitness.
  - The components of physical fitness are categorized into two categories:
    - Health-related components of physical fitness: Cardiorespiratory endurance, muscle strength, muscle endurance, flexibility, and body composition.
    - Skill-related components of physical fitness: Balance, agility, speed, power, coordination, and reaction time.

Reflection: Your Physical Activity, Exercise, and Physical Fitness

Take a moment to reflect on your physical fitness, physical activity, and exercise.

- How would you rate your level of physical fitness? Are you able to carry out daily tasks with vigor and without fatigue? Do you have a lot of energy?
- How does your level of physical activity impact your physical fitness level? Are you active throughout the day?
- What exercise do you purposefully perform that impacts your level of physical fitness? Do you follow an exercise program? Do you include regular exercise that helps your heart and lungs, and helps you become stronger?

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1.10.2: Health Benefits of Physical Activity and Exercise

Why is it important to be physically active and build your fitness? What are the health benefits of physical activity and exercise?

Living an active lifestyle is one of the most important things people can do to improve their health. Physical activity is beneficially for everyone, regardless of age, sex, race, ethnicity, or current fitness level, and benefits can start accumulating with small amounts of, and immediately after doing, physical activity. Being active improves your health in numerous ways.

The Health Benefits of Physical Activity—Major Research Findings

- Regular moderate-to-vigorous physical activity reduces the risk of many adverse health outcomes.
- Some physical activity is better than none.
- For most health outcomes, additional benefits occur as the amount of physical activity increases through higher intensity, greater frequency, and/or longer duration.
- Substantial health benefits for adults occur with 150 to 300 minutes a week of moderate-intensity physical activity, such as brisk walking. Additional benefits occur with more physical activity.
- Both aerobic and muscle-strengthening physical activity are beneficial.
- Health benefits occur for children and adolescents, young and middle-aged adults, older adults, and those in every studied racial and ethnic group.
- The health benefits of physical activity occur for people with chronic conditions or disabilities.
- The benefits of physical activity generally outweigh the risk of adverse outcomes or injury

Children and Adolescents

- Improved bone health (ages 3 through 17 years)
- Improved weight status (ages 3 through 17 years)
- Improved cardiorespiratory and muscular fitness (ages 6 through 17 years)
- Improved cardiometabolic health (ages 6 through 17 years)
- Improved cognition (ages 6 to 13 years)*
- Reduced risk of depression (ages 6 to 13 years)

Adults and Older Adults

- Lower risk of all-cause mortality
- Lower risk of cardiovascular disease mortality
- Lower risk of cardiovascular disease (including heart disease and stroke)
- Lower risk of hypertension
- Lower risk of type 2 diabetes
- Lower risk of adverse blood lipid profile
- Lower risk of cancers of the bladder, breast, colon, endometrium, esophagus, kidney, lung, and stomach
- Improved cognition*
- Reduced risk of dementia (including Alzheimer’s disease)
- Improved quality of life
- Reduced anxiety
- Reduced risk of depression
- Improved sleep
- Slowed or reduced weight gain
- Weight loss, particularly when combined with reduced calorie intake
- Prevention of weight regain following initial weight loss
- Improved bone health
- Improved physical function
- Lower risk of falls (older adults)
- Lower risk of fall-related injuries (older adults)

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1.10.3: Increase both Physical Activity and Physical Fitness

Increase Physical Activity: Move More, Sit Less

How much of your typical day do you spend sitting, reclining, or lying down? Are you considered a sedentary person?

Activity: Your daily movement patterns

Keep a journal and record your movement throughout the day. It is best to record a regular work day and also a weekend day.

Track the time you spend sitting, laying down, doing low intensity activities of daily living, and purposeful exercise.

Writing down a diary can help you to clearly see your active and inactive patterns in your life to help you identify opportunities for increasing physical activity.

A person who is described as sedentary means that they are sitting, reclining, or lying down. Most desk-based office work, driving a car, and watching television are examples of sedentary behaviors. It is important to limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits. If you are a sedentary person, the first thing you should do is identify opportunities throughout your day to move more and sit less.

Remember:

- Some physical activity is better than none.
- Everything counts! Move more!

Examples of strategies to increase activity throughout your day[5]:

- Walk instead of drive, whenever you can
- Walk your children to school
- Take the stairs instead of the escalator or elevator
- Take a family walk after dinner
- Replace a Sunday drive with a Sunday walk
- Go for a half-hour walk instead of watching TV
- Get off the bus a stop early, and walk
- Park farther from the store and walk
- Make a Saturday morning walk a family habit
- Walk briskly in the mall
- Take the dog on longer walks
- Go up hills instead of around them
- Garden, or make home repairs
- Do yard work. Get your children to help rake, weed, or plant
- Work around the house. Ask your children to help with active chores
- Wash the car by hand
- Use a rake instead of a leaf blower
- Avoid labor-saving devices, such as a remote control or electric mixers
- Do sit-ups in front of the TV. Have a sit-up competition with your children/friends

Some possible ways that fitness and health outcomes may relate to physical activity are:

- Physical activity leads to improvements in physical fitness, and physical fitness causes improvements in health outcomes;
- Physical fitness may modify the amount of the effect that physical activity has on health outcomes; or
- Physical activity can lead to improved physical fitness as a health outcome.

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1.10.4: Develop an Exercise Program to Build Your Physical Fitness

At least a minimal level of physical fitness is required in order to carry out daily activities without being physically overwhelmed. To build or sustain your physical fitness it is important to develop an exercise program that targets the important components of fitness. Development of these various components will improve your quality of life, reduce your risk of chronic disease, and optimize your health and well-being.

The Components of Physical Fitness

The components of physical fitness are often categorized into health-related components and skill-related (performance-related) components. Although skill-related components are valuable, most tend to be more specific toward athletes.

- **Health-related components of physical fitness:** Cardiorespiratory endurance, muscle strength, muscle endurance, flexibility, and body composition.
- **Skill-related components of physical fitness:** Balance, agility, speed, power, coordination, and reaction time.

Descriptions of the most common components of fitness are:

- **Aerobic physical activity** is activity in which the body's large muscles move in a rhythmic manner for a sustained period of time. Aerobic activity, also called endurance or cardio activity, improves cardiorespiratory fitness. Examples include brisk walking, running, swimming, and bicycling.
- **Balance** is a component of physical fitness that involves maintaining the body's equilibrium while stationary or moving.
    - **Balance training** includes static and dynamic exercises that are designed to improve individuals' ability to resist forces within or outside of the body that cause falls while a person is stationary or moving. Walking backward, standing on one leg, or using a wobble board are examples of balance-training activities.
- **Body composition** is a health-related component of physical fitness that applies to body weight and the relative amounts of muscle, fat, bone, and other vital tissues of the body. Most often, the components are limited to fat and lean body mass (or fat-free mass). Bone-strengthening activity. Physical activity designed primarily to increase the strength of specific sites in bones that make up the skeletal system.
- **Bone-strengthening** activities produce an impact or tension force on the bones that promotes bone growth and strength. Running, jumping rope, and lifting weights are examples of bone-strengthening activities.
- **Cardiorespiratory fitness (endurance)** is the ability to perform large-muscle, whole-body exercise at moderate-to-vigorous intensities for extended periods of time.
- **Flexibility** is a health- and performance-related component of physical fitness that is the range of motion possible at a joint. Flexibility is specific to each joint and depends on a number of specific variables, including but not limited to the tightness of specific muscles and tendons. Flexibility exercises enhance the ability of a joint to move through its full range of motion.
- **Muscle-strengthening activity** (strength training, resistance training, or muscular strength and endurance exercises) is physical activity, including exercise, that increases skeletal muscle strength, power, endurance, and mass.
- **Strength** is a health and performance component of physical fitness that is the ability of a muscle or muscle group to exert force.

Check your learning: Health and Skill Related Components of Fitness
Drag the elements to the correct area.

You can view an interactive element has been excluded from this text.

General Physical Activity Recommendations for Adults

It is recommended that:

- All adults should undertake regular physical activity.
- Adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for substantial health benefits.
- Adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.
- Adults may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity

throughout the week for additional health benefits.

Activity: Adding Physical Activity to Your Life

Don't worry if you're thinking, "How can I get the recommended amount of physical activity each week?" You'll be surprised by the variety of activities you have to choose from.

Set goals, choose activities that work for you, and stay on track with the Move Your Way[SM] Activity Planner.

The Move Your Way[SM] Activity Planner is an easy to use tool that allows you to indicate the types of workouts you enjoy and provide a printable report for you to follow to ensure you are meeting the physical activity guidelines.

Principles of Training

When designing your exercise routine, remember that it is important to overload your body to allow it to respond by building more strength or increasing the capacity of your cardiorespiratory system. Since your body will adapt to the overload, you cannot continue with the same exercise routine, you need to continue to increase the demand by progressively increasing your workouts. And lastly, be sure you are including a variety of exercises intended to build each specific body system.

The three **principles of training** are:

- **Overload** is the physical stress placed on the body when physical activity is greater in amount or intensity than usual. The body's structures and functions respond and adapt to these stresses. For example, aerobic physical activity places a stress on the cardiorespiratory system and muscles, requiring the lungs to move more air and the heart to pump more blood and deliver it to the working muscles. This increase in demand increases the efficiency and capacity of the lungs, heart, circulatory system, and exercising muscles. In the same way, muscle-strengthening and bone-strengthening activities overload muscles and bones, making them stronger.
- **Progression** is closely tied to overload. Once a person reaches a certain fitness level, he or she is able to progress to higher levels of physical activity by continued overload and adaptation. Small, progressive changes in overload help the body adapt to the additional stresses while minimizing the risk of injury.
- **Specificity** means that the benefits of physical activity are specific to the body systems that are doing the work. For example, the physiologic benefits of walking are largely specific to the lower body and the cardiovascular system. Push-ups primarily benefit the muscles of the chest, shoulders, and upper arms.

F.I.T.T. Principle

When designing your exercise routine, it is important to remember to target the health-related components of physical fitness and ensure you are meeting the recommended frequency, intensity, time, and type for each component, which is commonly referred to as the F.I.T.T Principle.

F.I.T.T Principle:

- **Frequency** refers to how often you will exercise.
- **Intensity** refers to how hard you will work during your exercise session.
- **Time** refers to how long your exercise session will be.
- **Type** refers to the type of exercise you will do to build your fitness.

The four elements of the F.I.T.T. principle help you create an exercise plan that will build or sustain your level of physical fitness.

F.I.T.T. for Cardiorespiratory Endurance (Aerobic Activity)

Frequency: At least 3 days a week.

Time: 150 minutes to 300 minutes a week of moderate-intensity, or 75 to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity. A general rule of thumb is that 2 minutes of moderate-intensity activity counts the same as 1 minute of vigorous-intensity activity. For example, 30 minutes of moderate-intensity activity is roughly the same as 15 minutes of vigorous-intensity activity. The 1996 Surgeon General's Report on Physical Activity and Health and the 2008 Physical Activity Guidelines for Americans included the guidance that aerobic activity needed to last at least 10 minutes to count in your total minutes of aerobic exercise each week. However, continued research into aerobic exercise bouts has shown that moderate-vigorous aerobic exercise of any length is beneficial for your health. So remember throughout your day that moderate-to-vigorous physical activity of any duration counts toward meeting the key guidelines.

Intensity: Moderate or vigorous intensity.

Type: Any exercise where the body's large muscles move in a rhythmic manner for a sustained period of time. Brisk walking, running, bicycling, jumping rope, and swimming are all examples. Aerobic activity causes a person's heart to beat faster, and they will breathe harder than normal.

Measuring Cardio Intensity

The intensity of your aerobic exercise is measured by how the activity affects your heart rate and breathing. All types of aerobic activities can count as long as they are of sufficient intensity to meet the description of moderate or vigorous-intensity.

Three ways to measure aerobic intensity include:

- **The Talk Test**
  - As a rule of thumb, a person doing moderate-intensity aerobic activity can talk, but not sing, during the activity. A person doing vigorous-intensity activity cannot say more than a few words without pausing for a breath.
- **Perceived Exertion**
  - Using perceived exertion provides a way for a person to assess their level of effort. As a rule of thumb, on a scale of 0 to 10, where sitting is 0 and the highest level of effort possible is 10, moderate-intensity activity is a 5 or 6. Vigorous-intensity activity begins at a level of 7 or 8 out of 10.
- **Target Heart Rate**
  - Focusing on how fast your heart is beating is a good indicator of your aerobic intensity. To figure out whether you are exercising within the target heart rate zone, you must either briefly stop exercising to take your pulse or wear a heart rate monitor while exercising.
  - Tips for taking your pulse:
    - You can take your pulse at your neck, wrist, or chest; wrist is recommended. When taking you pulse at your wrist, place the tips of the index and middle fingers over the artery that is in line with your thumb. Do not use the thumb to take your pulse. Take a full 60-second count of the heartbeats, or take for 30 seconds and multiply by 2.
  - Calculating your target heart rate
    - Step 1: Calculate your maximum heart rate
      - To estimate your maximum age-related heart rate, subtract your age from 220.
        - 220 – [age] = [maximum heart rate]
      - Example for a 25 year old
        - 220- 25= 195
    - Step 2: Calculate what your heart rate should be for moderate and vigorous intensity
      - **For moderate-intensity physical activity**, your target heart rate should be between 64% and 76% of your maximum heart rate.
        - 64% level: [maximum heart rate] x 0.64 = [beats per minute]
        - 76% level: [maximum heart rate] x 0.76 = [beats per minute]
        - For example, for a 25 year old, the 64% and 76% levels would be:
          - 64% level: 195 x 0.64 = 127 bpm
          - 76% level: 195 x 0.76 = 148 bpm
        - This shows that moderate-intensity physical activity for a 25-year-old person will require that the heart rate remains between 127 and 148 bpm during physical activity.
      - **For vigorous-intensity physical activity**, your target heart rate should be between 77% and 93% of your maximum heart rate.
        - 77% level: [maximum heart rate] x 0.77 = [beats per minute]
        - 93% level: [maximum heart rate] x 0.93 = [beats per minute]
        - For example, for a 25 year old, the 77% and 93% levels would be:
          - 77% level: 195 x 0.77 = 150 bpm
          - 93% level: 195 x 0.93 = 181 bpm

- This shows that vigorous-intensity physical activity for a 25-year-old person will require that the heart rate remains between about 150 and 181 bpm during physical activity.

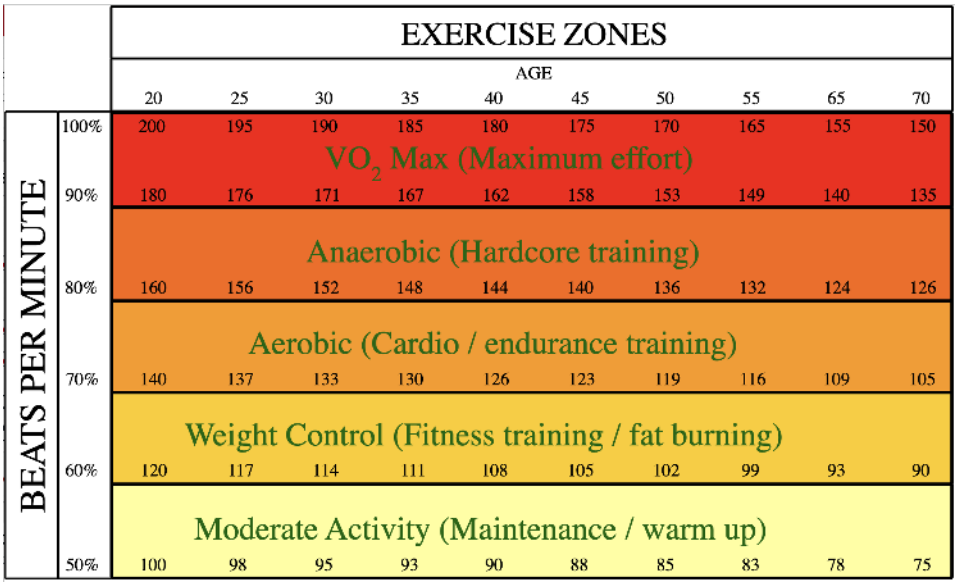


Figure 1.10.4.1: Target Heart Rate Zones

F.I.T.T. for Musculoskeletal Fitness (muscle strength and endurance)

Frequency: 2 or more days a week

Time: Repetitions and Sets are typically used as the measure of the amount of time spent doing muscle strengthening exercises. A repetition is a single time you perform the exercise, and the set is a group of repetitions separated by a period of rest. A person new to strength training may see benefit doing one set of 8-12 repetitions. If a persons goal is muscular endurance they may prefer to increase their repetitions to 12-20 repetitions. If a persons goal is muscular strength they may prefer to increase the sets and reduce the repetitions, such as doing five sets of 8 repetitions.

Intensity: Muscle-strengthening exercises should be performed to the point at which it would be difficult to do another repetition. The key is to overload the muscles. If you choose to complete one set of 12 repetitions, it is important to choose a weight where the 12th repetitions is very hard.

Type: Strength exercises that target all major muscle groups. Strength exercises make muscles do more work than they are accustomed to doing, that is, they overload the muscles. Examples of muscle-strengthening activities include lifting weights, working with resistance bands, doing calisthenics that use body weight for resistance (such as push-ups, pull-ups, and planks), carrying heavy loads, and heavy gardening. Muscle-strengthening activities count if they involve a moderate or greater level of intensity or effort and work the major muscle groups of the body—the legs, hips, back, chest, abdomen, shoulders, and arms.

The three Training Principles described previously, overload, progression, and specificity, are key to muscular development. You must choose strength exercises that are challenging to overload your muscles, you must continue to increase the intensity overtime to allow your muscles to adapt and grow stronger (progression), and you need to choose exercises to ensure you are focusing on each major muscle group. Improvements in muscle strength and endurance are progressive over time. Increases in the amount of weight or the days a week of exercising will result in stronger muscles.

Avoid muscle imbalance

It is important to ensure that you are exercising all major muscle groups. When one set of muscles are stronger, weaker, or tighter than the opposing group of muscles it can cause injuries or pain, or impact your bodies alignment or posture. Muscle imbalance might occur in athletes who have one dominate side or might occur through exercising when a person only focuses on specific areas. For example, if a person only performs strength training exercises to grow their biceps, chest, and quads, they are forgetting to also train the opposing muscle groups which are the triceps, back, and hamstrings. Be sure to train the major muscles of the legs, hips, back, abdomen, chest, shoulders, and arms.

F.I.T.T. for Flexibility (stretching activities)

The Physical Activity Guidelines for Americans (2nd edition) does not state specific recommendations for the frequency, intensity, or time for Flexibility. The following recommendations are from the American College of Sports Medicine (ACSM)[6].

Frequency: Equal to or greater than 2-3 times per week. Daily stretching is most effective.

Time: Holding a static stretch for 10-30s is recommended for most adults. In older individuals, holding a stretch for 30-60s may confer greater benefit toward flexibility.

Intensity: Stretch to the point of feeling tightness or slight discomfort.

Type: A series of flexibility exercises for each of the major muscle-tendon units is recommended.

Check your learning: FITT Principle Recommendations

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://pressbooks.pub/introtohealth/?p=25#h5p-6

Challenge: Does it FITT?

There are numerous websites that provide you with workout plans or routines.

Your challenge is to find a workout routine online that is at least one week in length.

Compare the workout routine to the FITT principle. Does the routine aligns with the FITT principle? Are there any misalignment or gaps? How could the workout routine be adjusted to better align with the FITT principle?

If you are having trouble finding free online workout programs take a look at the Free workout plans from Muscle and Fitness

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1.10.5: Guidance for your Current Level of Physical Activity

Are you inactive, insufficiently active, active, or highly active? Below is guidance specifically for your current fitness level.

Inactive means not getting any moderate- or vigorous intensity physical activity beyond basic movement from daily life activities.

- For people who are inactive, that is, people who do not do any moderate- or vigorous-intensity physical activity beyond basic movement from daily life activities:
  - Reducing sedentary behavior has health benefits. It reduces the risk of all-cause mortality, cardiovascular disease incidence and mortality, and the incidence of type 2 diabetes and some cancers. A good first step is to replace sedentary behavior with light-intensity physical activity. Previously, evidence that light intensity physical activity could provide health benefits was not sufficient to support a recommendation.
  - No matter how much time they spend in sedentary behavior or light-intensity activity, inactive people can reduce their health risks by gradually increasing their moderate-intensity physical activity.

Insufficiently active means doing some moderate- or vigorous-intensity physical activity but less than 150 minutes of moderate-intensity physical activity a week or 75 minutes of vigorous-intensity physical activity or the equivalent combination. This level is less than the target range for meeting the key guidelines for adults.

- For people who are insufficiently active, that is, people who do some moderate- or vigorous-intensity physical activity, but who do not yet meet the key guidelines target range (150 to 300 minutes a week of moderate-intensity physical activity for adults):
  - Even small increases in moderate-intensity physical activity provide health benefits. There is no threshold that must be exceeded before benefits begin to occur.
  - Greater benefits can be achieved by reducing sedentary behavior, increasing moderate-intensity physical activity, or a combination of both.
  - For any given increase in moderate-to-vigorous physical activity, the relative gain in benefits is greater for insufficiently active people than for people who are already meeting the key guidelines.

Active means doing the equivalent of 150 minutes to 300 minutes of moderate-intensity physical activity a week. This level meets the key guideline target range for adults.

- For people who are active, that is, people who already meet the key guidelines (150 to 300 minutes a week of moderate-intensity physical activity for adults):
  - Although those within the target range already have substantial benefits from their current volume of physical activity, more benefits can be gained by doing additional moderate-to-vigorous physical activity or reducing sedentary behavior.

Highly active means doing the equivalent of more than 300 minutes of moderate-intensity physical activity a week. This level exceeds the key guideline target range for adults.

- For people who are highly active, that is, people who do more than the equivalent of 300 minutes a week of moderate-intensity physical activity:
  - These people should maintain or increase their activity level by doing a variety of activities.

Exercise Safely

Key Guidelines for Safe Physical Activity include:

- **Be confident that physical activity can be safe for almost everyone,** yet recognized that activities may have risks.
- Choose physical activities that are appropriate for your current fitness level.
- Increase physical activity gradually over time. Inactive people should “start low and go slow” by starting with lower intensity activities and gradually increasing how often and how long activities are done.
- Take precautions when exercising to minimize risk. This might include using appropriate gear and sports equipment, choosing safe environments, following rules and policies, and making sensible choices about when, where, and how to be active.
- If you have chronic conditions or symptoms, be sure to consult with a health care professional or physical activity specialist to discuss the types and amounts of activity appropriate for you.

Assess Your Physical Activity Readiness

To help ensure you are of good physical health to start an exercise program, you are recommended to complete the. The Physical Activity Readiness Questionnaire for Everyone, called the PAR-Q+. This questionnaire is intended to determine if there are any underlying health issues that should be discussed with a doctor before starting an exercise program.

Take the PAR-Q+ test

Warm Up and Cool Down

Although the health benefits of including a warm-up and cool down are not yet proven, research studies of effective exercise programs typically include warm-up and cool-down activities. Warming up before and cooling down after exercise are commonly recommended to prevent injuries and adverse cardiac events. A warmup before moderate- or vigorous-intensity aerobic activity allows a gradual increase in heart rate and breathing at the start of the episode of activity. A cool-down after activity allows a gradual heart rate decrease at the end of the session.

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1.10.6: End-of-Chapter Material

Key takeaways for this Chapter

- It is important to be physical fit to be able to enjoy life.
- Being active everyday and purposefully exercising are important for your physical fitness.
- It is generally accepted that physical activity and exercise are beneficial for everyone, however it is important to communicate with your doctor.
- You need to do cardiorespiratory endurance exercise to support and build your heart and lungs.
  - Cardio exercise intensity should be moderate to vigorous which can be measured by your perceived intensity or by measuring your heart rate.
  - Cardio in any length is beneficial with a goal of a cumulative total of 150-300 minutes total from at least three days.
  - Cardio exercises include any exercises where the body's large muscles move in a rhythmic manner for a sustained period of time.
- You need to do strength training exercises to maintain and build your skeletal muscle.
  - You must challenge your muscles by overloading them. You can do this by increasing the weight used or increasing the repetitions and sets.
  - Make sure to strength train all major muscles groups at least two days/week.
- Stretching is important for flexibility.

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1.10.7: Fitness- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

6 tips for better sleep



A walk through the stages of sleep



Got a meeting? Take a walk



How daylight saving time affects our bodies, minds — and world



How do steroids affect your muscles— and the rest of your body?



How much sleep do you really need?



Physical therapy is boring — play a game instead



The benefits of good posture



The brain-changing benefits of exercise



The surprising reason our muscles get tired



What makes muscles grow?



What yoga does to your body and brain



Why do we dream?



Why sitting is bad for you



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SECTION OVERVIEW

1.11: Reducing the Risk of Cardiovascular Disease

Learning Outcomes

By the end of this chapter you will be able to:

- Describe how the cardiovascular system works
- Compare the risk and prevalence of cardiovascular disease
- Describe the common types of cardiovascular disease
- Identify risk factors for cardiovascular disease
- Interpret blood pressure and cholesterol readings

How does the heart work?

What happens when a person has a heart attack or a brain attack (stroke)?

What can you do to reduce your risk of cardiovascular disease?

Can you feel it if you have high blood pressure or high cholesterol?

One person dies every 36 seconds in the United States from cardiovascular disease. About **659,000 people in the United States** die from heart disease each year—that's **1 in every 4 deaths.** Heart disease is the leading cause of death in the United States, and stroke is the fifth leading cause of death. Heart disease costs the United States about **$363 billion** each year from 2016 to 2017. It is important for everyone to understand how their cardiovascular system works and the common types of diseases of the cardiovascular system.

1.11.1: The Cardiovascular System

1.11.2: Cardiovascular Diseases

1.11.3: Treatment for Cardiovascular Diseases

1.11.4: Risk Factors for Cardiovascular Disease

1.11.5: End-of-Chapter Material

1.11.6: Cardiovascular- Optional Continued Learning

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1.11.1: The Cardiovascular System

Activity: Your heart and breath

Before you begin this chapter, take a moment to feel your heart and your breathing.

- Take your pulse.
  - Count how many times your heart beats in one minute.
  - In your wrist:
    - hold out one of your hands, with your palm facing upwards
    - press the first (index) finger and middle finger of your other hand on the inside of your wrist, at the base of your thumb – don't use your thumb as it has its own pulse
    - press your skin lightly until you can feel your pulse – if you can't find it, try pressing a little harder or move your fingers around
  - In your neck:
    - press your first finger and middle finger to the side of your neck, just under your jaw and beside your windpipe – don't use your thumb
    - press your skin lightly to feel your pulse – if you can't find it, try pressing a bit harder or move your fingers around
- Measure your respiratory rate
  - Count how many times you inhale and exhale in one minute.
- Multiple your one minute pulse and your one minute count of breaths by 1,440 to see how many times your heart beats and how many times you inhale/exhale in one day

If your heart beats 75 times per minute, it would contract approximately 108,000 times in one day, more than 39 million times in one year, and nearly 3 billion times during a 75-year lifespan. Your heart is an amazing organ that works all day, everyday, to ensure all of the cells, tissues, and organs in your body get the oxygen and nutrients needed to survive, while also removing carbon dioxide and waste by pumping about 2,000 gallons of blood around your body. This is a lot of work for an organ about the size of your fist that weighs less than a pound.

The heart is the power, or the pumping force, behind the circulation of blood through the body. Every time your heart beats it is contracting in order to push blood, much like you would squeeze a plastic ketchup bottle and push out ketchup. The heart is just one part of the cardiovascular system, the other part are the vessels through which blood travels through the body. The heart and blood vessels are a closed-loop system, where blood moves in one direction to and from your heart.

The heart has two halves, each with atria and ventricles known as the right atrium, right ventricle, left atrium, and left ventricle. As a closed-loop system, blood moves through the heart in a precise pattern.

- Deoxygenated blood enters the heart through the largest vein of the body called the superior vena cava
- The deoxygenated blood first enter the heart through the right atrium.
- The blood is then pushed down into the right ventricle.
- The deoxygenated blood now leaves the heart to go to the lungs and pick up oxygen.
- Oxygenated blood then returns to the heart through the left atrium.
- The blood is pushed into the left ventricle.
- Lastly the oxygenated blood leaves the heart to go to the body through the largest artery of the body called the aorta.

Each side of the heart plays an important role in the circulation of blood. The right side of the heart is responsible for circulating the deoxygenated blood to the lungs to pick up oxygen, called pulmonary circulation, and the left side of the heart is responsible for circulating the blood to the rest of the body, called systemic circulation.

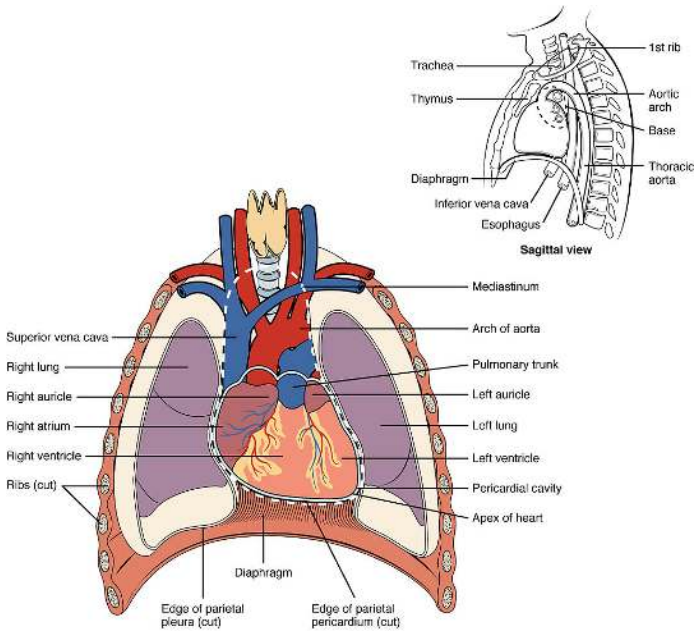


Figure 1.11.1.1: Position of the heart in the body

The three main types of blood vessels that transport blood throughout the body are the arteries, veins, and capillaries. In short, arteries are large blood vessels that carry blood away from the heart, veins are large blood vessels that carry blood to the heart, and capillaries are the small blood vessels that delivery oxygenated blood to organs and tissues and pick up deoxygenated blood from organs and tissues for the veins to take back to the heart. You might think of arteries and veins as big freeways or highways and the capillaries as the neighborhood streets, both working to provide a pathway to deliver food and take away waste.

In pictures of the circulatory system, arteries are typically represented by red blood vessels and veins are typically represented as blue blood vessels. Red is used for arteries because most arteries carry oxygenated blood, or red blood. Veins typically carry deoxygenated blood, or blue blood. The faster the heart beats, the more oxygen and nutrients are transported throughout the body.

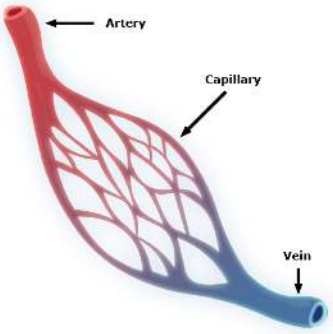


Figure 1.11.1.2: Arteries, capillaries, and veins

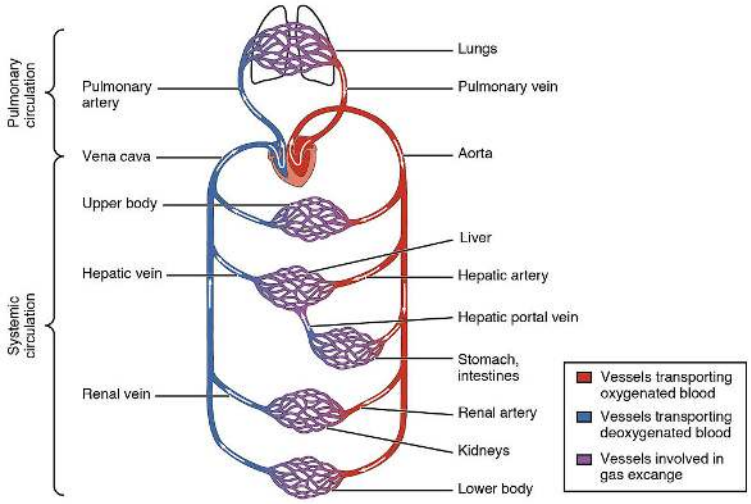


Figure 1.11.1.3: Blood flow through the heart

Each beat of the heart helps to keep the blood moving within the closed system, however the heart has an additional feature that helps to keep the blood moving in one direction and these are called heart valves. Heart valves ensure unidirectional blood flow through the heart. Valves operate link french doors that open when the heart contracts and close when the heart is at rest. The four valves in the heart are the tricuspid valve, pulmonary valve, bicuspid valve, and aortic valve.

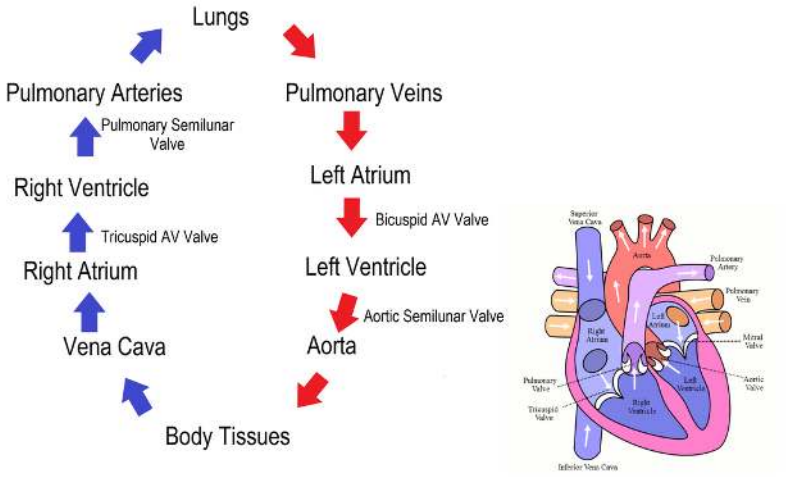


Figure 1.11.1.4: Circulation of blood through the heart

You do not tell you heart to beat, rather your heart beats automatically. For example, when your body needs more oxygen, such as when exercising, your bodies autonomic nervous system tells your heart to speed up to pump more blood throughout your body. The Autonomic nervous system specifically sends messages to a specialized group of cells located high in the right atrium, called the **Sinoatrial Node**, or SA node. The SA node is commonly referred to as the pacemaker of the heart and is responsible for normal cardiac rhythm by sending an electrical signal that makes the heart contract.

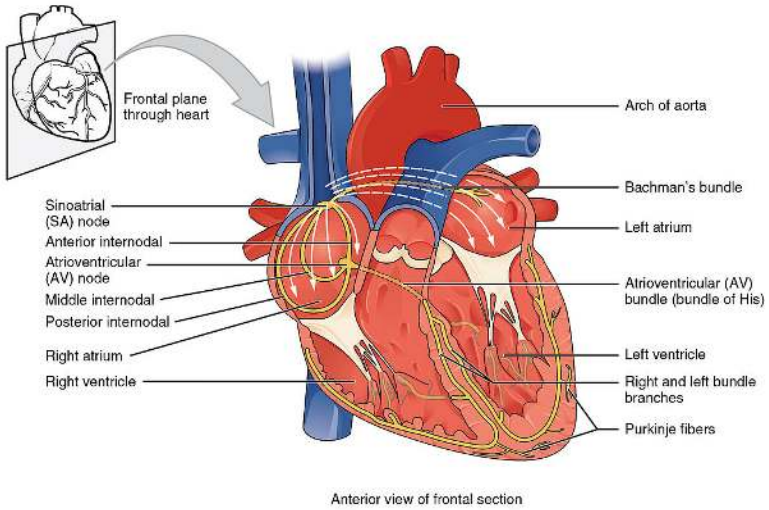


Figure 1.11.1.5: Conduction System of The Heart

The contraction of the heart is called **systole** and the relaxation of the heart is called **diastole**. Imagine clenching and relaxing your fist, when it is clenched that is representing systole and when it is relaxed that is diastole. When the heart contracts (systole) and pushes blood from the heart into the blood vessel (artery) it puts pressure on the blood vessel walls. When the heart relaxes (diastole) the pressure on the blood vessel walls lowers. By measuring the pressure in the blood vessel we can better understand the health of the heart and blood vessels. Measuring the pressure created in the blood vessel is known as your **blood pressure**. When you get your blood pressure tested they give you two numbers, the top number is the pressure created during systole and the bottom number is the pressure created during diastole. Thus, blood pressure readings are read as systolic over diastolic pressure. Average blood pressure is considered to be 120/80 (systolic/diastolic). If the pressure increases to 140/90 you are considered to have high blood pressure.

Manually pumping blood: CPR

If the heart stops beating, the blood can be manually pumped by using an emergency technique known as cardiopulmonary resuscitation (CPR). When performing CPR, repeated pressure is placed on the heart to push the blood through both the pulmonary and systemic circuits. This is particularly critical for the brain, as irreversible damage and death of neurons occur within minutes of loss of blood flow.

Trained first responders will perform both chest compressions and mouth-to-mouth breathing. However, bystanders should perform compression-only CPR.

1. Call 9-1-1 (or send someone to do that)
2. Push hard and fast in the center of the chest

Current standards call for compression of the chest at least 5 cm deep and at a rate of 100-120 compressions per minute, a rate equal to the beat in “Staying Alive,” recorded in 1977 by the Bee Gees.

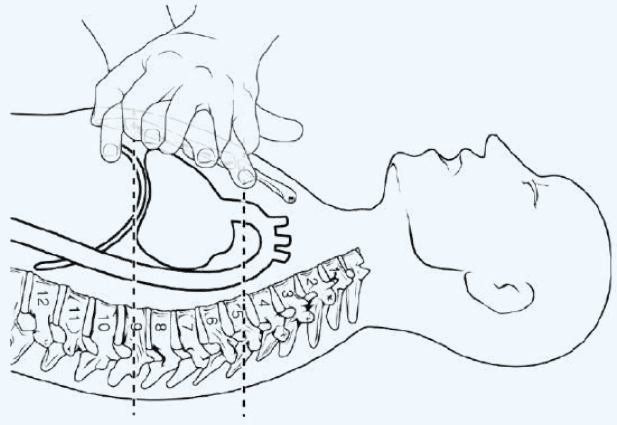


Figure 1.11.1.6: CPR Hand Placement

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1.11.2: Cardiovascular Diseases

The cardiovascular system is an intricate system and each part of the system plays an important role in ensuring your body receives the oxygen and nutrients it needs. Diseases of the cardiovascular includes diseases effecting the various elements of the heart and diseases impacting the ability of blood to move through the blood vessels.

The term “heart disease” refers to several types of heart conditions. The most common type of heart disease in the United States is coronary artery disease (CAD). The coronary artery is the artery that feeds oxygenated blood to the heart muscle itself. If the coronary artery is partially or fully blocked it affects the blood flow to the heart. When the heart muscle does not get oxygenated blood this is called a heart attack.

Sometimes heart disease may be “silent” and not diagnosed until a person experiences signs or symptoms of a heart attack, heart failure, or an arrhythmia. When these events happen, symptoms may include:

- Heart attack: Chest pain or discomfort, upper back or neck pain, indigestion, heartburn, nausea or vomiting, extreme fatigue, upper body discomfort, dizziness, and shortness of breath.
- Arrhythmia: Fluttering feelings in the chest (palpitations).
- Heart failure: Shortness of breath, fatigue, or swelling of the feet, ankles, legs, abdomen, or neck veins.

The risk factors for the majority of cardiovascular diseases are high blood pressure, high blood cholesterol, and smoking. About half of people in the United States (47%) have at least one of these three risk factors. Several other medical conditions and lifestyle choices can also put people at a higher risk for heart disease, including:

- Diabetes
- Overweight and obesity
- Unhealthy diet
- Physical inactivity
- Excessive alcohol use

Coronary Artery Disease

Coronary artery disease (CAD) is the leading cause of death worldwide and the most common type of heart disease in the United States. It is sometimes called coronary heart disease or ischemic heart disease. CAD is caused by plaque buildup in the walls of the arteries that supply blood to the heart and other parts of the body, this build up is called **Atherosclerosis**. As the coronary blood vessels become occluded, the flow of blood to the tissues will be restricted, a condition called ischemia that causes the cells to receive insufficient amounts of oxygen, called hypoxia. **Angina**, or chest pain and discomfort, is the most common symptom of CAD. Although angina is the most common symptom of CAD, for some people, the first sign of CAD is when they have a heart attack.

Over time, CAD can weaken the heart muscle. This may lead to heart failure, a serious condition where the heart can’t pump blood the way it should.

Arteriosclerosis and Atherosclerosis

Both atherosclerosis and arteriosclerosis negatively impact the ability of blood to flow freely throughout the body. Arteriosclerosis is known as the hardening of the artery and atherosclerosis is known as the thickening of the artery. Aging is a common factor in the hardening of the artery where the artery is losing elasticity and flexibility over time, however, lifestyle choices are a common factor in the thickening of the artery where plaques are building up in the artery.

Atherosclerosis is caused by an accumulation of plaque deposits of cholesterol and other substances in the artery. Plaque buildup causes the inside of the arteries to narrow over time, which can partially or totally block the blood flow. Atherosclerosis progresses slowly and often beginning in childhood and gradually progressing throughout life.

Well-documented risk factors include smoking, family history, hypertension, obesity, diabetes, high alcohol consumption, lack of exercise, stress, and hyperlipidemia or high circulating levels of lipids in the blood.

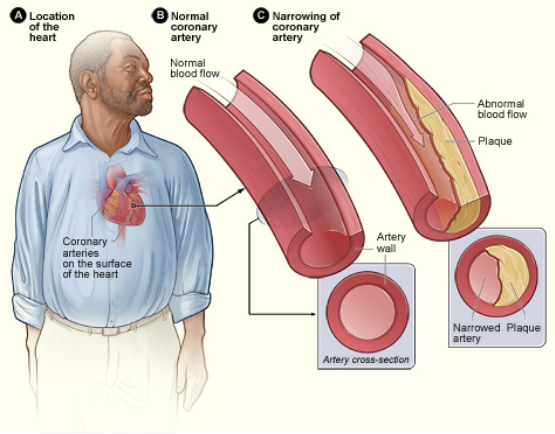


Figure 1.11.2.7: Atherosclerosis

Have you ever used a plunger

Take a moment to think about how the plumbing in a house or building works. When it works well, water comes into the house freely and waste from flushing the toilet or washing dishes flows out of the house. However, if the plumbing of a house get blocked by debris, then a backup occurs. Just like in a house, debris that blocks flow causes problems.

Angina

Angina, or chest pain and discomfort, is the most common symptom of CAD. Angina can happen when too much plaque builds up inside arteries, causing them to narrow. Narrowed arteries can cause chest pain because they can block blood flow to your heart muscle and the rest of your body.

Myocardial Infarction or “heart attack”

Myocardial infarction (MI) is the formal term for what is commonly referred to as a heart attack. It normally results from a lack of blood flow (ischemia) and oxygen (hypoxia) to a region of the heart, resulting in death of the cardiac muscle cells. An MI often occurs when a coronary artery is blocked by the buildup of atherosclerotic plaque. It can also occur when a portion of an unstable atherosclerotic plaque travels through the coronary arterial system and lodges in one of the smaller vessels. The resulting blockage restricts the flow of blood and oxygen to the myocardium and causes death of the tissue. MIs may be triggered by excessive exercise, in which the partially occluded artery is no longer able to pump sufficient quantities of blood, or severe stress, which may induce spasm of the smooth muscle in the walls of the vessel.

For many people, the first clue that they have CAD is a heart attack. Symptoms of heart attack include

- Chest pain or discomfort (angina)
- Weakness, light-headedness, nausea (feeling sick to your stomach), or a cold sweat
- Pain or discomfort in the arms or shoulder
- Shortness of breath

MIs may trigger cardiac arrest, but the two are not synonymous.

Cardiac Arrest and Arrhythmia

Cardiac arrest occurs when the heart suddenly and unexpectedly stops pumping. If this happens, blood stops flowing to the brain and other vital organs. The main cause of cardiac arrest is having an **arrhythmia**. An arrhythmia, or irregular heartbeat, is a problem with the rate or rhythm of your heartbeat. When a person suffers from cardiac arrest, there are a number of things that could potentially be happening to their heart: they could have a rapid heart rhythm (tachycardia), a disorganized electrical rhythm that doesn’t allow heart muscles to contract (fibrillation), or they could have no electrical current passing through their heart (asystole).

Nine out of 10 people who have a cardiac arrest outside of a hospital die — often within minutes.

Important risk factors include prior cardiac arrest, coronary heart disease, heart valve disease, congenital heart defects, and arrhythmias caused by faulty gene. However, half of cardiac arrests happen to people who did not know they had a heart problem.

"Clear"

Have you watched medical shows where a doctor grabs paddles, rubs them together, yells “clear,” and then shocks or zaps the patient? They are using a machine called a defibrillator that sends an electrical shock to the heart to try to get the electrical signals in the heart to contract in their regular rhythm. Although you might believe the defibrillator is restarting the heart, it is actually stopping the heart in order to try to get the hearts electrical signal to reset and resumes beating in a normal rhythmic way.

Congenital Heart Defects

Congenital heart defects are problems with the heart that are present at birth. They are the most common type of major birth defect. Examples include abnormal heart valves or holes in the heart’s walls that divide the heart’s chambers. Congenital heart defects range from minor to severe.

Heart Valve Defects

Heart valves prevent the backward flow of blood. They are located between the chambers of the heart and where the blood leaves and returns to the heart. Healthy heart valves can fully open and close the valve during the heartbeat, but diseased valves might not fully open and close. If the heart valves are diseased, the heart can’t effectively pump blood throughout the body and must work harder to pump, either while the blood is leaking back into the chamber or against a narrowed opening. This can lead to heart failure, sudden cardiac arrest (when the heart stops beating), heart palpitations (rapid, fluttering, or pounding), shortness of breath, or swelling in your legs and feet.

Valvular disorders are often caused by carditis, or inflammation of the heart. One common trigger for this inflammation is rheumatic fever, or scarlet fever, an autoimmune response to the presence of a bacterium, Streptococcus pyogenes, normally a disease of childhood.

Congestive Heart Failure

Heart failure is often called congestive heart failure because of fluid buildup in the lungs, liver, legs, and feet. Heart failure is a serious condition that occurs when the heart can’t pump enough blood to meet the body’s needs. It does not mean that the heart has stopped but that muscle is too weak to pump enough blood. Most of heart failure cases are chronic, or long-term heart failures.

The only cure for heart failure is a heart transplant. However, heart failure can be managed with medications or medical procedures.

Stroke or “brain attack”

A stroke is sometimes called a “brain attack” and is formally known as a Cerebrovascular Accident (CVA). Like a heart attack, a brain attack (stroke) occurs because oxygen cannot get to the brain. With a stroke, the oxygen may not be getting to the brain because of a blockage in the blood vessel (likely due to atherosclerosis) or due to a rupture of the blood vessel. In either case, parts of the brain become damaged or die. To work properly, your brain needs oxygen. Your arteries deliver oxygen-rich blood to all parts of your brain. If something happens to block the flow of blood, brain cells start to die **within minutes,** because they can’t get oxygen. This causes a stroke.

Time lost is brain lost. Every minute counts.

The brain controls our movements, stores our memories, and is the source of our thoughts, emotions, and language. The brain also controls many functions of the body, like breathing and digestion. The impact of a stroke is dependent on the part of the brain that is not getting the oxygen it needs. A stroke can cause lasting brain damage, long-term disability, or even death.

There are two types of stroke:

- Ischemic stroke
  - Most strokes are ischemic strokes. An ischemic stroke occurs when blood clots or other particles block the blood vessels to the brain. Fatty deposits called plaque can also cause blockages by building up in the blood vessels.
- Hemorrhagic stroke
  - A hemorrhagic stroke happens when an artery in the brain leaks blood or ruptures (breaks open). The leaked blood puts too much pressure on brain cells, which damages them. High blood pressure and aneurysms are examples of conditions that can cause a hemorrhagic stroke. Aneurysms are balloon-like bulges in an artery that can cause the artery to stretch and burst.

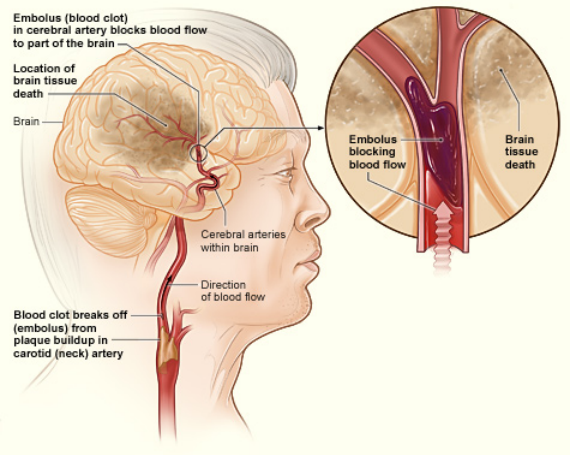


Figure 1.11.2.8: Ischemic Stroke

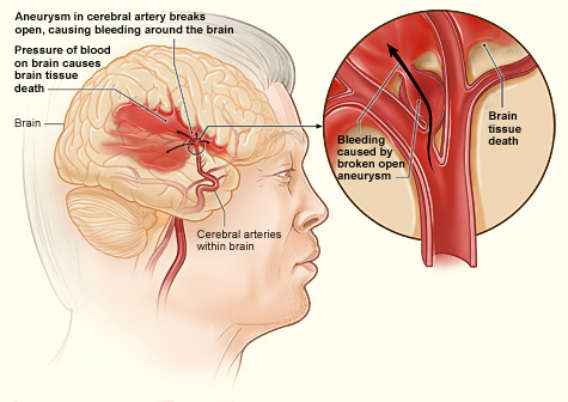


Figure 1.11.2.9: Hemorrhagic Stroke

A transient ischemic attack (TIA) is sometimes called a “mini-stroke” or a “warning stroke.” It is different from the major types of stroke, because blood flow to the brain is blocked for only a short time—usually no more than 5 minutes.

- A TIA is a warning sign of a future stroke.
- A TIA is a medical emergency, just like a major stroke.
- Strokes and TIAs require emergency care. **Call 9-1-1** right away if you feel signs of a stroke or see symptoms in someone around you.
- There is no way to know in the beginning whether symptoms are from a TIA or from a major type of stroke.
- Like ischemic strokes, blood clots often cause TIAs.
- More than a third of people who have a TIA and don’t get treatment have a major stroke within 1 year. As many as 10% to 15% of people will have a major stroke within 3 months of a TIA.

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1.11.3: Treatment for Cardiovascular Diseases

The best treatment for cardiovascular diseases is prevention. By living a healthy lifestyle, you can help keep your blood pressure, cholesterol, and blood sugar levels normal and lower your risk for heart disease and heart attack.

Choose healthy habits:

- Choose healthy foods
- Maintain a healthy weight
- Exercise regularly
- Don’t smoke

Understand your own health

- Have your Cholesterol levels checked regularly
- Measure your blood pressure regularly
- Manage your blood sugar levels and control diabetes
- Go to the doctor regularly. Many of the diseases of the cardiovascular system, like blood pressure, have no symptoms, so you will not know you have it without being tested.

If you suffer from cardiovascular diseases, there are several surgeries or procedures that me be required.

Medications

There are many types and combinations of drugs used to treat coronary artery disease (CAD), and your doctor or other health care provider will decide the best treatment combination for your situation. Some of the medications available include:

- Anticoagulants: Decrease the clotting (coagulating) ability of the blood. Sometimes called “blood thinners”
- Antiplatelet agents: Keep blood clots from forming by preventing blood platelets from sticking together.
- Angiotensin-Converting Enzyme (ACE) Inhibitors: Expand blood vessels and decreases resistance thus allowing blood to flow more easily and makes the heart’s work easier or more efficient.
- Beta blockers: Decrease the heart rate and force of contraction, which lowers blood pressure and makes the heart beat more slowly and with less force.

Balloon Angioplasty

Angioplasty is a procedure to improve blood flow in coronary arteries that have become narrow or blocked by mechanically widening the artery with a balloon. A specialized catheter with an expandable tip is inserted into the blocked blood vessel. The balloon is inflated to compress the plaque material and to open the vessel to increase blood flow. Then, the balloon is deflated and retracted. A stent consisting of a specialized mesh is typically inserted at the site of occlusion to reinforce the weakened and damaged walls. Stent insertions have been routine in cardiology for more than 40 years.

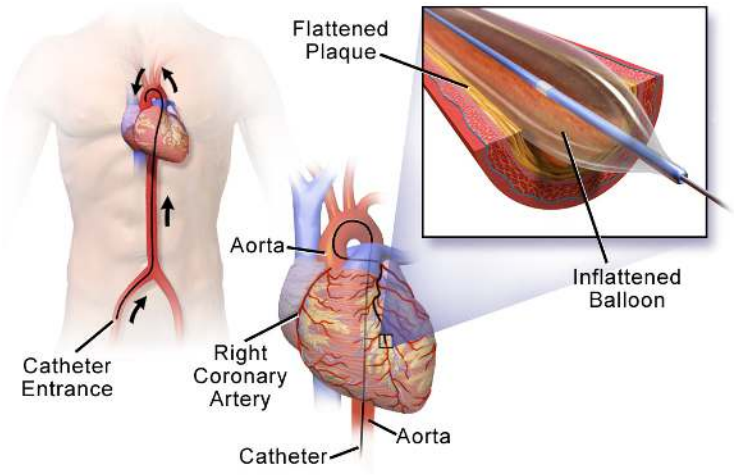


Figure 1.11.3.10: Balloon Angioplasty

Coronary Bypass Surgery

Sometimes arteries become so damaged that they cannot be healed or fixed. When this occurs, the only option is to create a new artery and bypass the damaged one, this is known as coronary bypass surgery. You might have heard of someone having a "quadruple bypass," what they are saying is that the surgeon had to create four new blood vessels to replace four coronary arteries that were blocked.

The surgery creates a new path for blood to flow to the heart. The surgeon takes a healthy piece of vein from the leg or artery from the chest or wrist. Then the surgeon attaches it to the coronary artery, just above and below the narrowed area or blockage. This allows blood to bypass (get around) the blockage.

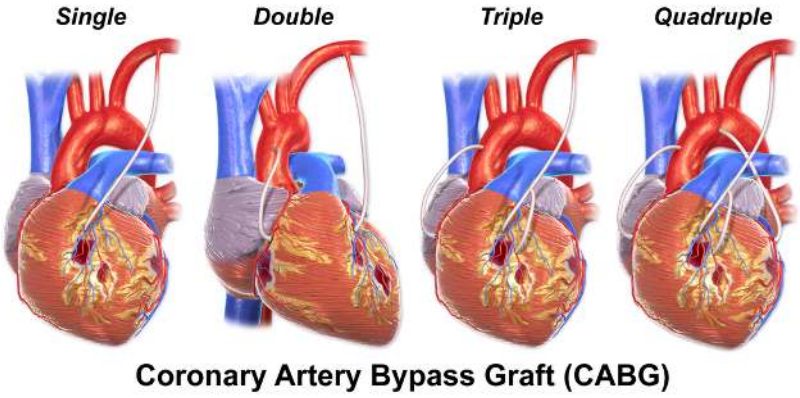


Figure 1.11.3.11: Coronary Bypass: single, double, triple, and quadruple

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1.11.4: Risk Factors for Cardiovascular Disease

Metabolic syndrome is a group of conditions that together raise your risk of coronary heart disease, diabetes, stroke, and other serious health problems. Metabolic syndrome is common in the United States; About 1 in 3 adults have metabolic syndrome. The good news is that it is largely preventable.

You might have metabolic syndrome if you have three or more of the following conditions:

- A large waistline: This is also called abdominal obesity or “having an apple shape.” Extra fat in your stomach area is a bigger risk factor for heart disease than extra fat in other parts of your body.
- High blood pressure: If your blood pressure rises and stays high for a long time, it can damage your heart and blood vessels. High blood pressure can also cause plaque, a waxy substance, to build up in your arteries. Plaque can cause heart and blood vessel diseases such as heart attack or stroke.
- High blood sugar levels: This can damage your blood vessels and raise your risk of getting blood clots. Blood clots can cause heart and blood vessel diseases.
- High blood triglycerides: Triglycerides are a type of fat found in your blood. High levels of triglycerides can raise your levels of LDL cholesterol, sometimes called bad cholesterol. This raises your risk of heart disease.
- Low HDL cholesterol, sometimes called good cholesterol: Blood cholesterol levels are important for heart health. “Good” HDL cholesterol can help remove “bad” LDL cholesterol from your blood vessels. “Bad” LDL cholesterol can cause plaque buildup in your blood vessels.

Risk factors you can control include:

- Lifestyle habits:
  - Being inactive
  - Eating an unhealthy diet and large portion sizes
  - Not getting enough good quality sleep, which helps control how your body absorbs nutrients from the food you eat
  - Smoking and drinking a lot of alcohol
- Occupation: Shift workers have a higher risk of metabolic syndrome because they often have circadian clocks that are not aligned with the environment. This can cause problems with how your body absorbs nutrients from food.

Risk factors you cannot control include:

- Age: Your risk of metabolic syndrome increases as you get older.
- Environment: Low socioeconomic status can lead to an unhealthy diet and an inactive lifestyle, and can cause you not to get enough sleep (sleep deprivation).
- Family history and genetics: Your genes can affect your weight or how your body responds to insulin. You have a higher risk of metabolic syndrome if others in your family have had diabetes, metabolic syndrome, or any of its risk factors.
- Other medical conditions: The following medical conditions can raise your risk of metabolic syndrome.
  - Overweight and obesity are the main risk factors for metabolic syndrome because they can raise “bad” LDL cholesterol, blood triglycerides, and blood pressure, and lower “good” HDL cholesterol. Overweight and obesity during pregnancy can raise your child’s risk of metabolic syndrome. In infants, a low birth weight and rapid weight gain after birth can raise the risk of metabolic syndrome later in life.
  - Polycystic ovary syndrome (PCOS) is a condition that causes fluid-filled sacs called cysts to grow on the ovaries. The hormone changes that cause PCOS can also cause you to have a large waistline, high blood sugar levels, high triglyceride levels, and low levels of “good” HDL cholesterol.
  - Problems with your immune system can cause some skin diseases such as psoriasis, which raise your risk. Certain cancer treatments that affect your immune system also can raise your risk.
  - Sleep problems, including not getting enough sleep (sleep deprivation), circadian rhythm disorders, and sleep apnea, can raise your risk.
  - Some medicines used to treat allergies, bipolar disorder, depression, HIV, and schizophrenia also raise your risk.
- Sex: In older adults, women have a higher risk of metabolic syndrome than men. This is because changes in hormone levels after menopause can raise the risk of a large waistline, high blood sugar levels, and low levels of “good” HDL cholesterol.

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1.11.5: End-of-Chapter Material

Key takeaways for this Chapter

- Cardiovascular disease is the leading cause of death.
- Cardiovascular disease includes diseases of the heart and blood vessels.
- The heart is the “pumping” force behind your blood flow.
- Arteries carry blood away from the heart to your organs and tissues
- Veins carry blood back to your heart from your organs and tissues.
- Blood pressure readings show your systolic pressure over your diastolic pressure, or the pressure during contraction over your pressure during relaxation.
- Both arteriosclerosis and atherosclerosis impact the ability of blood to flow freely in your blood vessels.
- A heart attack is the blockage in a coronary artery.
- A “brain attack” or stroke is the blockage or rupture of the artery that brings oxygenated blood to the brain.
- Everyone should know how to do CPR compressions to keep blood circulating when a person heart has stopped beating.
- Risks for cardiovascular disease are highly lifestyle dependent

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1.11.6: Cardiovascular- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

A life-saving device that detects silent heart attacks



Can we regenerate heart muscle with stem cells?



How does heart transplant surgery work?



How I repaired my own heart



How the heart actually pumps blood



How your emotions change the shape of your heart



My stroke of insight



What causes seizures, and how can we treat them?



What happens during a heart attack?



What is consciousness?



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SECTION OVERVIEW

1.12: Preventing Cancer

Learning Objectives

By the end of this chapter you will be able to:

- Explain how cancer begins and spreads.
- Describe the difference between benign and malignant tumors.
- Compare incidence and risk factors for common types of cancer.
- Identify ways to prevent cancer

How does cancer start?

How does cancer spread through the body?

What are the most common types of cancer?

How do I know if I have cancer?

The human body is composed of trillions of cells and every cell has a specific purpose. Cells provide structure for the body, take in nutrients from food, convert those nutrients into energy, and carry out specialized functions. When cells become damaged or die, the body makes new cells to replace them. For example, the epidermis of our skin continually makes new skin cells and we shed off old dead skin cells. Unfortunately, sometimes the cells in our body change and they begin to grow and divide when they shouldn't, this is known as Cancer, all cancers begin with a change in just one microscopic cell.

Cancer is the 2nd leading cause of death in the U.S. after cardiovascular disease. In the United States in 2019, 1,752,735 new cancer cases were reported and 599,589 people died of cancer. For every 100,000 people, 439 new cancer cases were reported and 146 people died of cancer. In 2022 in the U.S., there will be an estimated 1,918,030 new cancer cases and 609,360 cancer deaths.

Cancer has a major impact on society in the United States and across the world. Thankfully, in the United States, the likelihood of dying from cancer has dropped steadily since the 1990s. Five-year survival rates for some cancers, such as breast, prostate, and thyroid cancers, now are 90 percent or better and the 5-year survival rate for all cancers combined is currently about 67 percent.

1.12.1: Understanding Cancer

1.12.2: Types of Cancer

1.12.3: Cancer Screening and Symptoms

1.12.4: Cancer Risk and Prevention

1.12.5: End-of-Chapter Material

1.12.6: Cancer- Optional Continued Learning

The information in this chapter comes primarily from two Public Domain sources:

- The National Cancer Institute
- The Center for Disease Control- Cancer

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1.12.1: Understanding Cancer

Cancer can start almost anywhere in the human body, when just one of the trillions of cells changes and begins to grow uncontrollably and spread to other parts of the body. Normally, human cells grow and multiply (through a process called cell division) to form new cells as the body needs them. When cells grow old or become damaged, they are supposed to die and new cells take their place, however sometimes abnormal or damaged cells grow and multiply when they shouldn't. These cells typically form tumors, which are lumps of tissue.

Normal Cells versus Cancer Cells

Cells group themselves together to make up the tissues and organs of our bodies and usually we have just the right number of each type of cell. This is because cells produce signals to control how much and how often the cells divide. For example, when the body is growing, such as from childhood to adulthood, the body will signal for more cells as the body tissues grow. Normal healthy cells also like each other, they know which other cells to join up with, and they stick together.

Normal cells:

- control their growth, reproducing when and where it's needed.
- stick together and remain in their intended location in the body.
- die when they become damaged or too old to maintain homeostasis.
- become specialized with specific functions.

Cancer cells:

- grow in the absence of signals telling them to grow (normal cells only grow when they receive such signals).
- ignore signals that normally tell cells to stop dividing or to die .
- invade into nearby areas and spread to other areas of the body.
- tell blood vessels to grow toward tumors.
- hide from or trick the the immune system. The immune system normally eliminates damaged or abnormal cells. Cancers cells can trick the immune system into helping cancer cells stay alive and grow.
- accumulate multiple changes in their chromosomes, such as duplications and deletions of chromosome parts. Some cancer cells have double the normal number of chromosomes.
- rely on different kinds of nutrients than normal cells. In addition, some cancer cells make energy from nutrients in a different way than most normal cells. This lets cancer cells grow more quickly.

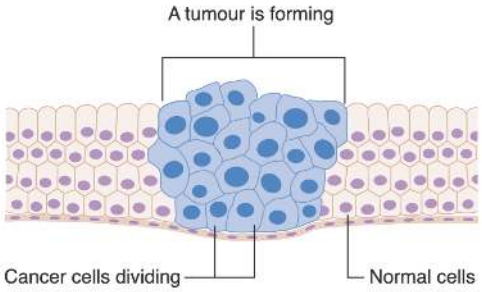


Figure 1.12.1.1: Diagram showing how cancer cells keep on reproducing to form a tumor

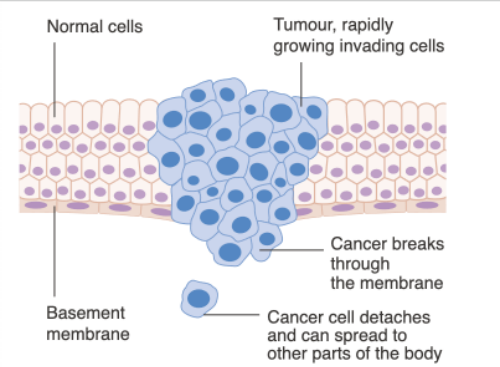


Figure 1.12.1.2: Diagram showing a tumor forcing its way through normal tissues

Benign versus Malignant Tumors

When cells grow and divide they may form tumors, which are a lump of tissue. These lumps might be benign or malignant. A benign tumor is not cancerous, a malignant tumor is cancerous. However, not all cancers form tumors, leukemia is a cancer of the blood cells that does not develop tumors, instead, the cancer cells build up in the blood and sometimes the bone marrow.

The big difference between a cancerous (malignant) tumor versus a non-cancerous (benign) tumor is the ability of the tumor to spread to other areas of the body, which is called **metastasis**. Benign tumors do not spread into, or invade, nearby tissues and are usually left in the body unless it is causing pain or is life threatening, such as benign tumors in the brain. Whereas, cancerous (malignant) tumors spread into, or invade, nearby tissues and can travel to distant places in the body to form new tumors.

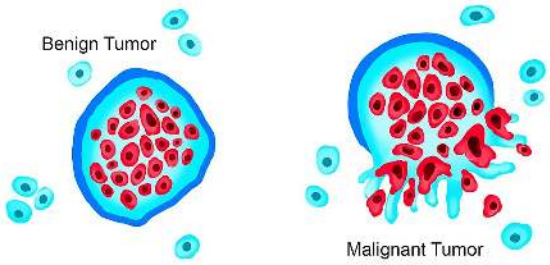


Figure 1.12.1.3: Benign Tumor versus Malignant Tumor

Benign tumors:

- usually grow quite slowly
- don’t spread to other parts of the body
- usually have a covering made up of normal cells

Malignant tumors:

- usually grow faster than benign tumors
- spread into surrounding tissues and cause damage
- may spread to other parts of the body in the bloodstream or through the lymph system to form secondary tumors. This is called metastasis

Metastasis

Cancer cells don’t like each other and do not stick together like normal cells. Rather, cancer cells leave their origin and spread to other parts of the body. The development of secondary malignant growths at a distance from a primary site of cancer is known as metastasis. When a cancer has spread to other parts of the body it is determined to be stage IV (4) cancer.

Cancer cells spread through the body in a series of steps:

1. Grow into, or invade, nearby normal tissue.
2. Move through the walls of nearby lymph nodes or blood vessels.

3. Travel through the lymphatic system and bloodstream to other parts of the body.
4. Stop in small blood vessels at a distant location, invading the blood vessel walls, and moving into the surrounding tissue.
5. Grow in this tissue until a tiny tumor forms.
6. Cause new blood vessels to grow, which creates a blood supply that allows the metastatic tumor to continue growing.

Cancer can metastasize to several places in the body, however it will be known by the primary site where the initial cancer cell began. For example, if a person has breast cancer that has spread to the lung, they will be determined to have stage IV breast cancer with lung metastases, not as lung cancer.

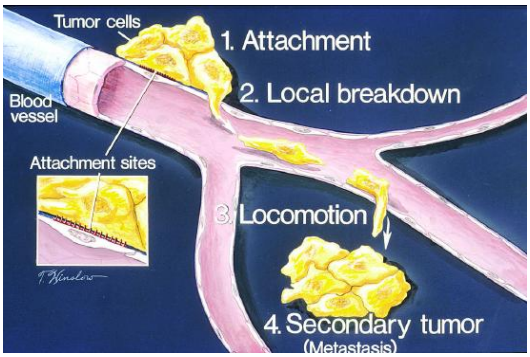


Figure 1.12.1.4: Cancer Metastasis

Table 1.12.1.1: Main Sites of Metastasis Based on Common Type of Cancer

Cancer Type	Main Sites of Metastasis or Secondary Tumors
Bladder	Bone, liver, lung
Breast	Bone, brain, liver, lung
Colon	Liver, lung, peritoneum
Kidney	Adrenal gland, bone, brain, liver, lung
Lung	Adrenal gland, bone, brain, liver, other lung
Melanoma	Bone, brain, liver, lung, skin, muscle
Ovary	Liver, lung, peritoneum
Pancreas	Liver, lung, peritoneum
Prostate	Adrenal gland, bone, liver, lung
Rectal	Liver, lung, peritoneum
Stomach	Liver, lung, peritoneum
Thyroid	Bone, liver, lung
Uterus	Bone, liver, lung, peritoneum, vagina

Cancer Stages

The cancer stage refers to the extent of your cancer, such as how large the tumor is, and if it has spread. A cancer is always referred to by the stage it was given at diagnosis, even if it gets worse or spreads. New information about how a cancer has changed over time gets added on to the original stage. So, the stage doesn't change, even though the cancer might.

Table 1.12.1.2: Stages of Cancer

Stage	What it means
Stage 0	Abnormal cells are present but have not spread to nearby tissue. Also called carcinoma in situ, or CIS. CIS is not cancer, but it may become cancer.

Stage	What it means
Stage I, Stage II, and Stage III	Cancer is present. The higher the number, the larger the cancer tumor and the more it has spread into nearby tissues.
Stage IV	The cancer has spread to distant parts of the body.

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1.12.2: Types of Cancer

There are more than 100 types of cancer. Types of cancer are usually named for the organs or tissues where the cancers form. For example, lung cancer starts in the lung, and brain cancer starts in the brain. Cancers also may be described by the type of cell that formed them, such as an epithelial cell or a squamous cell.

Common categories of cancers that begin in specific types of cells include carcinomas, sarcomas, leukemias, lymphoma, myeloma, and melanoma.

- Carcinoma
  - Carcinomas are the most common type of cancer. They are formed by epithelial cells, which are the cells that cover the inside and outside surfaces of the body.
- Sarcoma
  - Sarcomas are cancers that form in bone and soft tissues, including muscle, fat, blood vessels, lymph vessels, and fibrous tissue (such as tendons and ligaments).
- Leukemia
  - Cancers that begin in the blood-forming tissue of the bone marrow are called leukemias. These cancers do not form solid tumors. Instead, large numbers of abnormal white blood cells (leukemia cells and leukemic blast cells) build up in the blood and bone marrow, crowding out normal blood cells.
- Lymphoma
  - Lymphoma is cancer that begins in lymphocytes (T cells or B cells). These are disease-fighting white blood cells that are part of the immune system. In lymphoma, abnormal lymphocytes build up in lymph nodes and lymph vessels, as well as in other organs of the body.
- Multiple Myeloma
  - Multiple myeloma is cancer that begins in plasma cells, another type of immune cell. The abnormal plasma cells, called myeloma cells, build up in the bone marrow and form tumors in bones all through the body.
- Melanoma
  - Melanoma is cancer that begins in cells that become melanocytes, which are specialized cells that make melanin (the pigment that gives skin its color). Most melanomas form on the skin, but melanomas can also form in other pigmented tissues, such as the eye.
- Brain and Spinal Cord Tumors
  - There are different types of brain and spinal cord tumors. These tumors are named based on the type of cell in which they formed and where the tumor first formed in the central nervous system. For example, an astrocytic tumor begins in star-shaped brain cells called astrocytes, which help keep nerve cells healthy. Brain tumors can be benign (not cancer) or malignant (cancer).

✔ Compare types of cancer

The National Cancer Institute provides in depth information into the types of cancers. One of the ways they provide the information covering about 100 types of cancer is by the location in the body. Take a moment to compare a few types of cancer for specific areas of the body to better understand the similarities and differences. You can compare the statistics, causes and prevention, treatment, and screening options.

Visit the National Cancer Institute's "Cancers by Location/System"

Cancers Rates

Cancer is the 2nd leading cause of death. Based on data from 2015-2017 it is estimated that about 39.5% of men and women will be diagnosed with cancer at some point in their lifetime. Cancer statistics provide data on the number of new cases and on the number of deaths. Comparing incident rate and death rate can be helpful for understanding the survival rate of various types of cancer. For example, estimations for 2022 show breast cancer incident as 290,560 with 43,780 deaths, however Lung cancer shows 236,740 incidents with 130,180 deaths. This data shows us that lung cancer has a much higher rate of mortality than breast cancer.

Table 1.12.2.3: National Cancer Society Estimated Cancer Incident and Death Rates for 2022 (listed by incident rate highest to lowest)
Source: American Cancer Society, 2022

Cancer Type	Estimated New Cases	Estimated Deaths
Breast	290,560	43,780
Prostate	268,490	34,500
Lung and bronchus	236,740	130,180
Colorectum	151,030	52,580
Melanoma of the skin	99,780	7,650
Urinary bladder	81,180	17,100
Non-Hodgkin lymphoma	80,470	20,250
Kidney and renal pelvis	79,000	13,920
Uterine corpus	65,950	12,550
Pancreas	62,210	49,830
Leukemia	60,650	24,000
Oral cavity and pharynx	54,000	11,230
Thyroid	43,800	2,230
Liver and intrahepatic bile duct	41,260	30,520
Myeloma	34,470	12,640
Stomach	26,380	11,090
Brain and other nervous system	25050	18280
Esophagus	20,640	16,410
Ovary	19,880	12,810
Cervix	14,100	42,80
Soft tissue (including heart)	13190	51,30
Larynx	12,470	3,820
Gallbladder and other biliary	12,130	4400
Small intestine	11,790	1,960
Testis	9,910	460
Anus, anal canal and anorectum	9,440	1,670
Vagina and other female genital	8,870	1,630
Hodgkin lymphoma	8,540	920
Vulva	6,330	1,560
Ureter and other urinary organs	4,010	970
Bones and joints	3,910	2,100
Eye and orbit	3,360	410
Penis and other male genital	2,070	470

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1.12.3: Cancer Screening and Symptoms

Before learning about the various cancer symptoms, it is important to note that many cancers have no symptoms, rather they are asymptomatic. It is important to get annual checkups and screenings to detect cancer. For example, women should get pap tests annually and mammograms after 40 (or earlier if breast cancer runs in their family. Men and women should get a colonoscopy every 10 years starting at 45.

Early detection is key for cancer survival!

The acronym CAUTION is a helpful reminder of the most common symptoms of cancer that you should watch out for. If you see any of the following symptoms please make an appointment with your primary care physician.

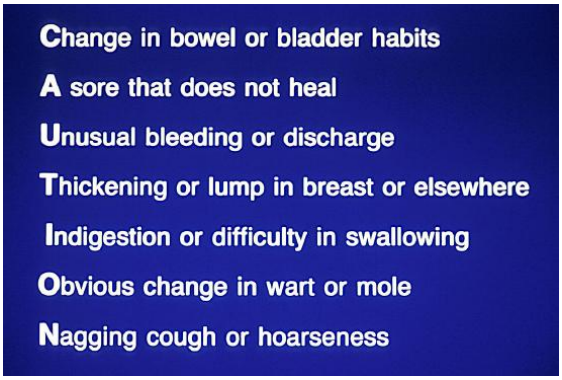


Figure 1.12.3.5: Cancer Warning Signs

Symptoms as related to type of cancer include:

Lung and bronchus

- Coughing that gets worse or doesn't go away.
- Chest pain.
- Shortness of breath.
- Wheezing.
- Coughing up blood.
- Feeling very tired all the time.
- Weight loss with no known cause.

Breast (female)

- New lump in the breast or underarm (armpit).
- Thickening or swelling of part of the breast.
- Irritation or dimpling of breast skin.
- Redness or flaky skin in the nipple area or the breast.
- Pulling in of the nipple or pain in the nipple area.
- Nipple discharge other than breast milk, including blood.
- Any change in the size or the shape of the breast.
- Pain in any area of the breast.

Prostate

- Difficulty starting urination.
- Weak or interrupted flow of urine.
- Frequent urination, especially at night.
- Difficulty emptying the bladder completely.
- Pain or burning during urination.
- Blood in the urine or semen.
- Pain in the back, hips, or pelvis that doesn't go away.
- Painful ejaculation.

Colorectal

- A change in bowel habits.
- Blood in or on your stool (bowel movement).
- Diarrhea, constipation, or feeling that the bowel does not empty all the way.
- Abdominal pain, aches, or cramps that don’t go away.
- Weight loss and you don’t know why.

Pancreas

- often asymptomatic
- jaundice
- Abdominal or back pain.
- nausea and vomiting.
- weight loss or poor appetite.

Liver

- Discomfort in the upper abdomen on the right side.
- A swollen abdomen.
- A hard lump on the right side just below the rib cage.
- Pain near the right shoulder blade or in the back.
- Jaundice (yellowing of the skin and whites of the eyes).
- Easy bruising or bleeding.
- Unusual tiredness.
- Nausea and vomiting.
- Loss of appetite.
- Weight loss for no known reason.

Ovary

- Vaginal bleeding (particularly if you are past menopause), or discharge from your vagina that is not normal for you.
- Pain or pressure in the pelvic area.
- Abdominal or back pain.
- Bloating.
- Feeling full too quickly, or difficulty eating.
- A change in your bathroom habits, such as more frequent or urgent need to urinate and/or constipation.

Leukemia

- Feeling tired (fatigue)
- Feeling weak
- Feeling cold
- Feeling dizzy or lightheaded
- Shortness of breath
- Paler skin

Non-Hodgkin lymphoma

- swollen lymph nodes, especially in the part of
- fever
- night sweats
- feeling tired
- weight loss.

Uterine

- Vaginal bleeding, or discharge from your vagina that is not normal for you.
- Pain or pressure in the pelvic area.

Brain and other nervous system

- Brain tumor symptoms can include:
  - Morning headache or headache that goes away after vomiting
  - Seizures
  - Vision, hearing, and speech problems
  - Loss of appetite
  - Frequent nausea and vomiting
  - Changes in personality, mood, ability to focus, or behavior
  - Weakness, loss of balance, and trouble walking
  - Unusual sleepiness
- Spinal cord tumor symptoms can include:
  - Back pain or pain that spreads from the back towards the arms or legs
  - A change in bowel habits or trouble urinating
  - Weakness or numbness in the arms or legs
  - Trouble walking

Urinary bladder

- Blood in the urine. This is the most common symptom.
- Having to urinate often.
- Pain while urinating.
- Back pain.
- Pelvic pain.

Esophagus

- Trouble swallowing
- Chest pain
- Weight loss
- Hoarseness
- Chronic cough
- Vomiting
- Bone pain (if cancer has spread to the bone)

Kidney and renal pelvis

- Blood in the urine.
- A lump or swelling in the kidney area or abdomen.
- Lower back pain or pain in the side that doesn’t go away.
- Feeling tired often.
- Fever that keeps coming back.
- Not feeling like eating.
- Losing weight for no reason that you know of.
- Something blocking your bowels.
- A general feeling of poor health.

Myeloma

- Commonly asymptomatic
- Bone pain, especially in the back or ribs
- Bones that break easily
- Fever for no known reason;
- Frequent infections; bruising or bleeding easily
- Trouble breathing;
- Weakness of the arms or legs
- Feeling very tired.

Stomach

- Commonly asymptomatic
- Poor appetite
- Weight loss (without trying)
- Abdominal (belly) pain
- Vague discomfort in the abdomen, usually above the navel
- Feeling full after eating only a small meal
- Heartburn or indigestion
- Nausea
- Vomiting, with or without blood
- Swelling or fluid build-up in the abdomen
- Blood in the stool
- Feeling tired or weak, as a result of having too few red blood cells (anemia)
- Yellowing of the skin and eyes (jaundice), if the cancer spreads to the liver

Oral cavity and pharynx

- A white or red sore that does not heal on the gums, tongue, or lining of the mouth.
- Swelling in the jaw.
- Unusual bleeding or pain in the mouth.
- A lump or thickening.
- Problems with dentures.
- Trouble breathing or speaking.
- A lump or thickening.
- Trouble chewing or swallowing food.
- A feeling that something is caught in the throat.
- Pain in the throat that won’t go away.
- Pain or ringing in the ears or trouble hearing.

Cervix

- Vaginal bleeding, or discharge from your vagina that is not normal for you.

Melanoma of the skin

- A-B-C-D-Es of melanoma
  - Asymmetrical: Does the mole or spot have an irregular shape with two parts that look very different?
  - Border: Is the border irregular or jagged?
  - Color: Is the color uneven?
  - Diameter: Is the mole or spot larger than the size of a pea?
  - Evolving: Has the mole or spot changed during the past few weeks or months?

Larynx

- Pain when swallowing.
- Ear pain.

Thyroid

- A lump or swelling on the side of the neck is the most common symptom.
- Having trouble breathing.
- Having trouble swallowing.
- Having a hoarse voice.

Testis

- A lump or enlargement in either testicle
- A feeling of heaviness in the scrotum
- A dull ache in the abdomen or groin
- A sudden collection of fluid in the scrotum

- Pain or discomfort in a testicle or the scrotum
- Enlargement or tenderness of the breasts
- Back pain

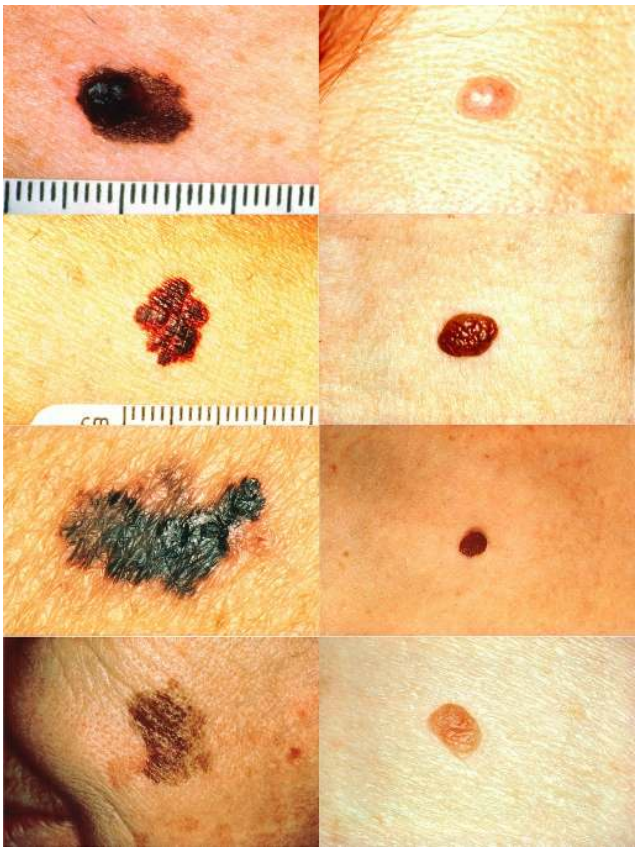


FIGURE 1.12.3.6: The ABCD'S of Skin Cancer Detection

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1.12.4: Cancer Risk and Prevention

Cancer prevention are actions you can take to lower the chance of getting cancer. It is usually not possible to know exactly why one person develops cancer and another doesn't. But research has shown that certain risk factors may increase a person's chances of developing cancer. Understanding the risk factors can help you to make lifestyle choices to try to prevent or lower your risk of cancer.

- Age
  - Advancing age is the most important risk factor for cancer overall and for many individual cancer types. The incidence rates for cancer overall climb steadily as age increases, from fewer than 25 cases per 100,000 people in age groups under age 20, to about 350 per 100,000 people among those aged 45–49, to more than 1,000 per 100,000 people in age groups 60 years and older.
- Alcohol
  - Drinking alcohol can increase your risk of cancer of the mouth, throat, esophagus, larynx (voice box), liver, and breast. The more you drink, the higher your risk. The risk of cancer is much higher for those who drink alcohol and also use tobacco.
- Environmental Carcinogens
  - People can avoid some cancer-causing exposures, such as tobacco smoke and the sun's rays. But other ones are harder to avoid, especially if they are in the air we breathe, the water we drink, the food we eat, or the materials we use to do our jobs. Being exposed to chemicals and other substances in the environment has been linked to some cancers. A few carcinogens in our environment include: Arsenic, formaldehyde, asbestos, radon, wood dust, mineral oils, and soot.
- Chronic Inflammation
  - In chronic inflammation, the inflammatory process may begin even if there is no injury, and it does not end when it should. Why the inflammation continues is not always known. Chronic inflammation may be caused by infections that don't go away, abnormal immune reactions to normal tissues, or conditions such as obesity. Over time, chronic inflammation can cause DNA damage and lead to cancer.
- Diet
  - Many studies have looked at the possibility that specific dietary components or nutrients are associated with increases or decreases in cancer risk, however results have been inconclusive or need further research. It is hard to study the effects of diet on cancer because a person's diet includes foods that may protect against cancer and foods that may increase the risk of cancer. Although the research is inconclusive, dietary relations to cancer have included:
    - Antioxidants may lower cancer risk by blocking the activity of free radicals that damage cells.
    - Artificial sweeteners have been shown to cause bladder cancer in animals.
    - Higher intakes of calcium and may reduce risks of colorectal cancer.
    - Charred meat increases exposure to chemicals that can cause cancer in animals.
    - Red meat is associated with an increased risk of colon and rectum cancer.
    - Cruciferous vegetables may have anticancer effects.
    - Fluoridated water helps decrease tooth decay, but may increase cancer risk.
    - Tea may lower cancer risk by blocking the activity of free radicals that damage cells.
    - Higher intakes of vitamin D or higher levels of vitamin D in the blood may be associated with a reduced risk of colorectal cancer.
- Hormones
  - Estrogens, a group of female sex hormones, are known human carcinogens. Although these hormones have essential physiological roles in both females and males, they have also been associated with an increased risk of certain cancers.
- Immunosuppression
  - Many people who receive organ transplants take medications to suppress the immune system so the body won't reject the organ. These "immunosuppressive" drugs make the immune system less able to detect and destroy cancer cells or fight off infections that cause cancer.
- Infectious Agents
  - Certain infectious agents, including viruses, bacteria, and parasites, can cause cancer or increase the risk that cancer will form.

- Obesity
  - People with obesity may have an increased risk of several types of cancer, including cancers of the breast (in women who have been through menopause), colon, rectum, endometrium (lining of the uterus), esophagus, kidney, pancreas, and gallbladder.
- Radiation
  - Radiation of certain wavelengths, called ionizing radiation, has enough energy to damage DNA and cause cancer.
- Sunlight
  - The sun, sunlamps, and tanning booths all give off ultraviolet (UV) radiation. Exposure to UV radiation causes early aging of the skin and damage that can lead to skin cancer.
- Tobacco
  - Tobacco use is a leading cause of cancer and of death from cancer. Cigarette smoking is the number one risk factor for lung cancer. In the United States, cigarette smoking is linked to about 80% to 90% of lung cancer deaths. People who smoke cigarettes are 15 to 30 times more likely to get lung cancer or die from lung cancer than people who do not smoke.
- Physical activity
  - Studies show that people who are physically active have a lower risk of certain cancers than those who are not. It is not known if physical activity itself is the reason for this.
- Diabetes
  - Some studies show that having diabetes may slightly increase the risk of having several different types of cancer.

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1.12.5: End-of-Chapter Material

Key takeaways for this Chapter

- Cancer starts with the change in one cell in the body.
- Cancer cells do not like each other and break off from the other cells to spread throughout the body, called Metastasis.
- A cancerous tumor is called malignant, a non-cancerous tumor is called benign.
- Cancer is the 2nd leading cause of death.
- Many cancers are asymptomatic.
- The acronym CAUTION is helpful for remembering some common cancer symptoms.
- Lifestyle choices can impact your risk of getting cancer.

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1.12.6: Cancer- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

Could a breathalyzer detect cancer?



Hacking bacteria to fight cancer



How cancer cells communicate — and how we can slow them down



How do cancer cells behave differently from healthy ones?



How does chemotherapy work?



How gratitude rewires your brain



How work kept me going during my cancer treatment



The incredible cancer-detecting potential of photoacoustic imaging



We can hack our immune cells to fight cancer



What almost dying taught me about living



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SECTION OVERVIEW

1.13: Protecting Against Infectious Diseases, and STD's/STI's

Learning Objectives

By the end of this chapter you will be able to:

- List the common types of pathogens (disease causing agents)
- Describe how the Immune system works to fight off infection
- Compare the role of the various types of immune cells
- Explain how vaccines work
- Explain the signs and symptoms of the most common STD's/STI's

How does the immune system fight off disease?

What are the different kinds of organisms that cause disease?

What can you do to try to stop the spread of diseases?

How do you know if you have an STD?

1.13.1: The Immune System

1.13.2: Sexually Transmitted Diseases (STD'S)

1.13.3: End-of-Chapter Material

1.13.4: Protecting Health- Optional Continued Learning

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1.13.1: The Immune System

Imagine a number that is ten billion times the number of stars in the universe, this is the estimated number of viruses on Earth[1]. Viruses are just one type of microorganism in our environment. Some microorganisms are detrimental to our health making us sick, others are important for our health (beneficial), and others are inconsequential. The microorganisms that cause diseases in humans are called **pathogens**. In total, there are about 1,400 known species of human pathogens that fall into five groups known as bacteria, virus, fungi, protozoa, and helminths (worms).

Pathogens are found in the air around us, the food we eat, what we drink, and the people and animals we are around, thus we are constantly exposed pathogens. Thankfully our immune system is in a constant battle working to identify the foreign invader (pathogen) and destroy them. This immune system battle is happening right now while you are reading this book!

The main purpose of the immune system is to protect your body from harmful substances, germs and cell changes that could make you ill. With this purpose, the immune system works to:

- fight disease-causing germs (pathogens) like bacteria, viruses, parasites or fungi, and to remove them from the body,
- recognize and neutralize harmful substances from the environment, and
- fight disease-causing changes in the body, such as cancer cells.

Your immune system is made up of two parts that work together to fight off disease. The innate immune system works to constantly find and destroy any foreign invaders, and the adaptive immune system works by remembering previous pathogens and infections to be able to launch a more efficient battle to destroy pathogens upon re-exposure.

The immune system includes white blood cells, organs, and tissues of the lymph system, such as the thymus, spleen, tonsils, lymph nodes, lymph vessels, and bone marrow. The white blood cells, or immune cells, that help the body fight infections and other diseases include neutrophils, eosinophils, basophils, mast cells, monocytes, macrophages, dendritic cells, natural killer cells, and lymphocytes (B cells and T cells).

The immune system is an amazing system of protection, however sometimes it cannot destroy the pathogen and this is when infection or disease occurs, like the Flu, Strep Throat, or a Sexually Transmitted Disease (STD).

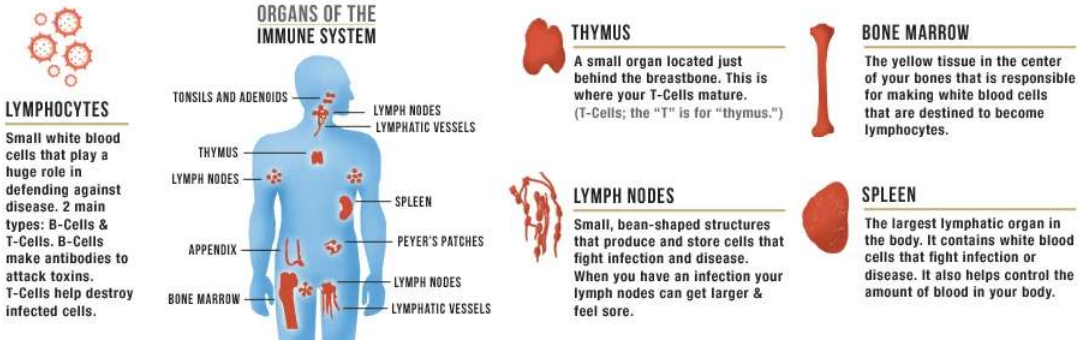


Figure 1.13.1.1*: Organs of the Immune System*

Pathogens and Infectious Diseases

The number of viruses and bacteria on earth is staggering[2] and they occupy essentially every environment. For example, a liter of surface seawater typically contains in excess of ten billion bacteria and 100 billion viruses. The vast majority of viruses and bacteria we are exposed to have no negative effect, some can even be beneficial, however a tiny fraction of these can severely affect our health. It is estimated that only about 1,400 of a trillion microbial species are human pathogens. Pathogens are too small to be seen by the naked eye and they live all around us in water, soil, and air.

The agents that cause disease, or pathogens, fall into five groups: viruses, bacteria, fungi, protozoa, and helminths (worms). Protozoa and worms are usually grouped together as parasites.

Table 1.13.1.1: Type of Pathogen and Related Infectious Diseases

Virus	Bacteria	Fungi	Parasites/Protozoa

Virus	Bacteria	Fungi	Parasites/Protozoa
• Common cold (Rhinoviruses) • The flu (influenza) • COVID-19 (SARS-CoV-2 virus) • Stomach flu (norovirus or rotovirus) • Hepatitis (Hepatitis, A, B, C, D, E virus) • Seasonal lung infection (Respiratory syncytial virus (RSV))	• Strep throat (Streptococcus bacterium) • salmonellosis (Salmonella bacteria) • Tuberculosis (Mycobacterium tuberculosis) • Whooping cough (Bordetella pertussis bacteria) • Chlamydia, gonorrhea and other sexually transmitted diseases (STDs).	• Ringworm (like athlete's foot). • Fungal nail infections. • Vaginal candidiasis (vaginal yeast infection). • Thrush.	• Giardiasis. • Toxoplasmosis. • Hookworms. • Pinworms.

Common Viruses and Mutations

Every year warnings are shared about the annual flu season. The flu is a contagious respiratory illness caused by the influenza viruses that infect the nose, throat, and lungs. It can cause mild to severe illness, and at times can lead to death. Although the flu can be caught year round, in the U.S. it is most common in the Fall and Winter seasons. The flu virus is not the same each year due to what is known as antigenic drift and antigenic shift which essentially indicates that the influenza virus has changed and thus the body will likely react differently to the variations.

Viruses can only replicate if they are absorbed by cells in the body, thus viruses survive based on the ability to continue to infect hosts. In order to continue to infect humans, the virus has to overcome the humans immune systems. Since the immune system can remember past viral infections, viruses mutate and change over time to be able to adapt to their surroundings and more effectively move from host to host. When viruses mutate they evolve into new variants. Virus variants are similar to a family tree with multiple lineages (or closely related groups of variants) and sublineages. Each variant starts with a parent lineage followed by descendant lineages. For example, with COVID-19, the BA.1.1.529 variant is from the Omicron variant.

✔ Pandemics

There is a difference between an endemic, outbreak, epidemic, and pandemic[3]. An **endemic** condition occurs at a predictable rate among a population. An **outbreak** corresponds to an unpredicted increase in the number of people presenting a health condition or in the occurrence of cases in a new area. An **epidemic** is an outbreak that spreads to larger geographic areas. A **pandemic** is an epidemic that spreads globally.

Pandemics have occurred throughout history impacting the entire world, some of these include:

- Three plagues during the years: 541-543, 1347-1351, and 1885-ongoing.
- Six pandemics of cholera during the years: 1817-1824, 1827-1835, 1839-1856, 1863-1875, 1881-1886, and 1899-1893.
- And numerous flu pandemics: Russian flu from 1889-1893, Spanish flu from 1918-1919, Asian flu from 1957-1959, Hong Kong flu from 1968-1970, SARS from 2002-2003, Swine flu from 2009-2010, MERS from 2015-ongoing, and more recent COVID-19 from 2019-ongoing.

Table ✔ 1.13.1.2 List of some of the pandemics that occurred throughout history.

Pandemic	Timeline	Area of emergence	Pathogen	Vector	Death toll
Athenian Plague	430-26 B.C.	Ethiopia	Unknown	Unknown	Unknown
Antonine Plague	165-180	Iraq	Variola virus	Humans	5 million
Justinian Plague	541-543	Egypt	Yersinia pestis	Rodents' associated fleas	30-50 million

Pandemic	Timeline	Area of emergence	Pathogen	Vector	Death toll
Black Death	1347-1351	Central Asia	Yersinia pestis	Rodents' associated fleas	200 million
The Seven Cholera Pandemics	1817-present	India	Vibrio cholerae	Contaminated water	40 million
Spanish Flu	1918-1919	USA	Influenza A (H1N1)		50 million
Asian Flu	1957-1958	China	Influenza A (H2N2)		>1 million
Hong Kong Flu	1968	China	Influenza A (H3N2)		1-4 million
HIV/AIDS	1981-present	Central Africa	HIV		36 million
Severe acute respiratory syndrome coronavirus	2002-2003	China	Severe acute respiratory syndrome coronavirus	Bats	774
Swine Flu	2009-2010	Mexico	Influenza A (H1N1)		148000-249000
Ebola	2014-2016	Central Africa	Ebola virus	Unknown	11000
COVID-19	2019- July 2021 (ongoing)	China	SARS-Cov-2	Unknown	>4 million (ongoing)

The COVID-19 pandemic was caused by a virus called SARS-CoV-2. Viruses constantly change through mutation and sometimes these mutations result in a new variant of the virus. COVID variations include the Omicron variant and Delta variant, with new variants of the virus expected to occur. The COVOD-19 pandemic is the first global pandemic requiring large-scale responses since the 1918 Spanish flu. As of 2022, COVID-19 is still considered a pandemic and there is still concern of continued spread, sickness, and death.

Pandemics: The Chain of Infection

The way in which people become infected with a pathogen is referred to as the Chain of Infection.

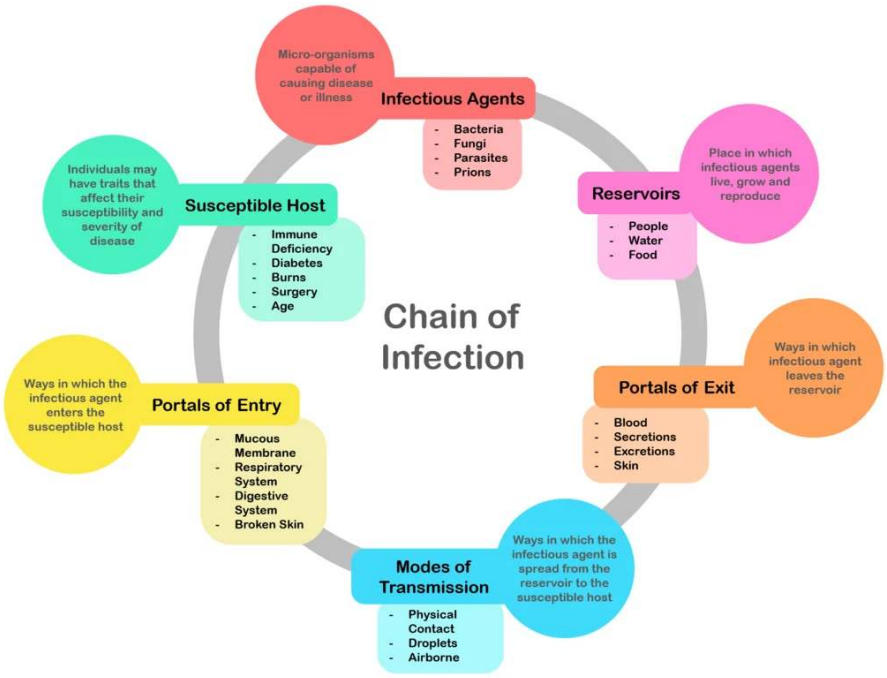


Figure 1.13.1.2 *: The Chain of Infection*

The chain of infection begins with the **"Infectious Agent."** The infectious agent is a pathogen, a microorganism that is capable of causing disease. There are about 1,400 different pathogens that fall within five main categories of bacteria, virus, fungi, protozoa, and worms.

The infectious agent begins in a "**Reservoir**." The reservoir could be another person, an animal, in water, or in food; it is the habitat in which the infectious agent normally lives, grows, and multiplies. The reservoir may or may not be the source from which an agent is transferred to a host. For example, the reservoir of Clostridium botulinum is soil, but the source of most botulism infections is improperly canned food containing C. botulinum spores. Human reservoirs may or may not show the effects of illness. A carrier is a person with inapparent infection who is capable of transmitting the pathogen to others. Asymptomatic or passive or healthy carriers are those who never experience symptoms despite being infected. Carriers commonly transmit disease because they do not realize they are infected, and consequently take no special precautions to prevent transmission.

The infectious agent needs a way to leave the reservoir through a **"Portal of Exit."** For a person, this could include breathing out air, or a cut through the skin, touching or rubbing your nose, coughing, sexual intercourse, feces, urine, mucus, or blood.

The infectious agent then needs a **"Mode of Transmission**" to the new host. The mode of transmission could be direct or indirect. Direct contact and direct spreading of droplets often occur when two people are close together or touching, this could be through hugging, sexual intercourse, or droplets spreading when talking or sneezing when someone is close by. Indirect transmission could occur through the air, on a vehicle such as food or drinks, or transmitted by an insect like a mosquito, flee, or tick.

The infectious agent then needs to a **"Portal of Entry**" into the new susceptible new host, these are ways the infectious agent could enter the body. The portal of entry must provide access to tissues in which the pathogen can multiply. This might include inhaling the infectious agent into the respiratory system, consuming it through food or drink therefore entering the digestive system, or entering directly into blood or tissues through breaks in the skin.

The final step in the Chain of Infection is when the infectious agent has successfully entered the **Susceptible Host**. If a pathogen gets past a host's defenses, it will attempt to infect the host and begin replicating itself; The pathogens must infect a host in order to grow or replicate. However, just because the pathogen has successfully entered the host does not mean they will get infected! This is where the power of the immune system steps in to fight off the infection destroying the infectious agent.

The survival of human pathogens, like viruses, bacteria, and parasites, is dependent upon quickly invading a human, replicating, and efficiently transmitting to others. Pathogens depend on the chain of infection for survival. You can take precautions to break the chain of infection at each step in the chain by doing the following:

- Recognize signs and symptoms of disease in order to get treatment and isolate when needed.

- Wash your hands and/or use hand sanitizer
- Cleaning and disinfect surfaces
- Get treatment from a doctor
    - If you have a bacterial infection you need antibiotics. *Antibiotics* are medicines that fight bacterial infections.
- Avoid touching your face
- Do not cough into your hand, cough into your arm or elbow.
- Use pest control
- Wear personal protective equipment to put a barrier between the portal of exit or entry.
- Use air purifiers to reduce airborne pathogens.
- Properly dispose of waste.
- Drink clean drinking water.
- Follow food safety guidelines.
- Immunizations/vaccines to reduce the susceptibility of the new host.

The Immune System Battle

When an infectious agent leaves a reservoir through a portal of exit and finds a mode of transmission, it is then up to the defenses of the new host to try to reduce the chances of infection. This is when the immune system battle commences which includes two main subsystems of the immune system, called the innate immune system and the adaptive immune system. The innate immune system is what you are born with and the adaptive immune system is developed overtime as your body is exposed to pathogens. The innate immune response is always present and attempts to defend against all pathogens rather than focusing on specific ones. Conversely, the adaptive immune response stores information about past infections and mounts pathogen-specific defenses.

The innate immune system includes the bodies physical and chemical barriers along with white blood cells that are always present in the blood and tissues ready to destroy any and all invading pathogens. The adaptive immune system also includes white blood cells, but they are more specialized and ready to destroy specific pathogens.

Immune System: Physical and Chemical Barriers

The first step in the battle against pathogens is to put up a physical barrier against the portal of entry. The largest physical barrier against pathogens is our skin. Skin provides provides both a barrier of entry and a means to destroy pathogens through skin acidity and dryness. The areas of the body that are not covered with skin have alternative methods of defenses using mucus and secretions, like tears in the eyes, wax in the ears, and cilia and mucus in the nose, mouth, and lungs. Despite these barriers, pathogens may enter the body through skin abrasions or punctures, or by collecting on mucosal surfaces in large numbers that overcome the mucus or cilia. Some pathogens have evolved specific mechanisms that allow them to overcome physical and chemical barriers. When pathogens do enter the body, the innate and adaptive immune systems responds.

The Innate and Adaptive Immune System

The main job of the innate immune system is to fight harmful substances and germs that enter the body, for instance through the skin or digestive system. The innate immune system is the rapid response to any invading pathogen, the response is non-specific meaning the same response for any and all pathogens. The adaptive immune system makes antibodies and uses them to specifically fight certain germs that the body has previously come into contact with. This is also known as an “acquired” (learned) or specific immune response. Because the adaptive immune system is constantly learning and adapting, the body can also fight bacteria or viruses that change over time.

Both the innate and the adaptive immune system rely on markers that are on body cells. These markers tell the immune system whether the cell is a human cell that belongs in the body, or whether the cell is foreign. Pathogens have two markers. One marker is non-specific called a Pathogen-Associated Molecular Patterns (PAMPs), the other markers is specific called an Antigen. Many pathogens share the same PAMPs, however have unique and distinctive antigens; Every invader’s antigenic pattern is unique. The innate immune cells have receptors called Pattern Recognizing Molecules (PRMs) that recognize the PAMP. When the innate cells recognize the PAMP they begin the battle to destroy the foreign invaders. Adaptive immune system cells recognize the specific antigens on the pathogen and launch a battle specifically to destroy that pathogen.

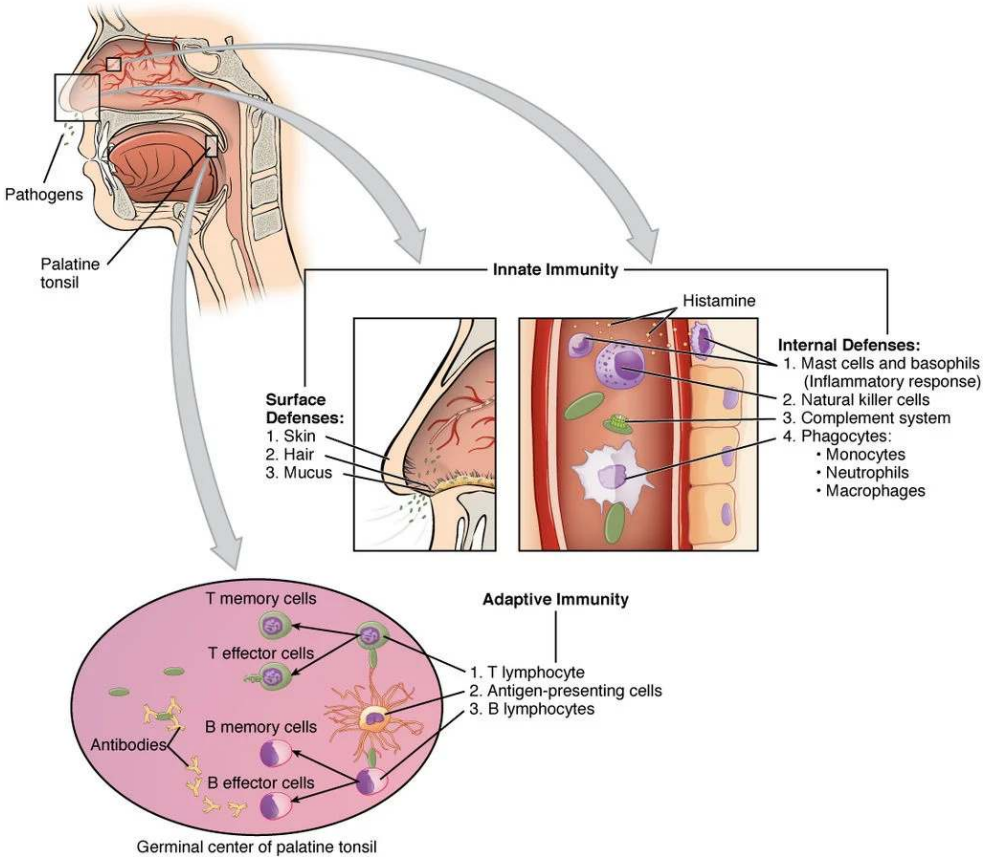


Figure 1.13.1.3 *: Diagram of the Innate and Adaptive Immune System*

The innate immune system cells are the first to respond, these include the following types of leukocytes: mast cells, macrophages, natural killer cells, dendritic cells, monocytes, neutrophils, basophils, and eosinophils (described in Figure 11.?). Cells of the adaptive immune system are classified as lymphocytes (a type of leukocyte) and include two main types: T-cells and B-cells (the letters denote ‘thymus’ and ‘bone marrow’, the tissues where each of these leukocytes mature).

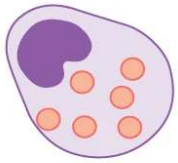
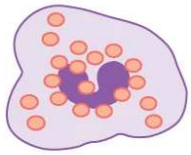
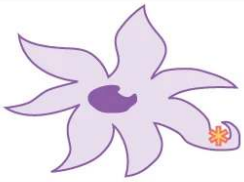
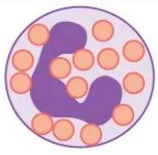
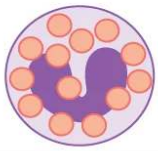
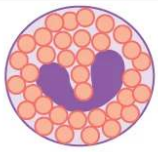
Cell type	Characteristics	Location	Image
Mast cell	Dilates blood vessels and induces inflammation through release of histamines and heparin. Recruits macrophages and neutrophils. Involved in wound healing and defense against pathogens but can also be responsible for allergic reactions.	Connective tissues, mucous membranes	
Macrophage	Phagocytic cell that consumes foreign pathogens and cancer cells. Stimulates response of other immune cells.	Migrates from blood vessels into tissues.	
Natural killer cell	Kills tumor cells and virus-infected cells.	Circulates in blood and migrates into tissues.	
Dendritic cell	Presents antigens on its surface, thereby triggering adaptive immunity.	Present in epithelial tissue, including skin, lung and tissues of the digestive tract. Migrates to lymph nodes upon activation.	
Monocyte	Differentiates into macrophages and dendritic cells in response to inflammation.	Stored in spleen, moves through blood vessels to infected tissues.	
Neutrophil	First responders at the site of infection or trauma, this abundant phagocytic cell represents 50-60 percent of all leukocytes. Releases toxins that kill or inhibit bacteria and fungi and recruits other immune cells to the site of infection.	Migrates from blood vessels into tissues.	
Basophil	Responsible for defense against parasites. Releases histamines that cause inflammation and may be responsible for allergic reactions.	Circulates in blood and migrates to tissues.	
Eosinophil	Releases toxins that kill bacteria and parasites but also causes tissue damage.	Circulates in blood and migrates to tissues.	

Figure 1.13.1.4: The characteristics and location of cells involved in the innate immune system

Steps to the The Immune System Battle:

- The cellular immune response begins when a pathogen gets through the bodies physical and chemical barriers.
- If a pathogen gets past the hosts defenses it will attempt to infect the host and begin replicating itself. The subsequent battle between the germs and the body's immune system will cause the symptoms of illness.
- The first immune cells to respond to the invading pathogen are the innate immune cells: mast cells, macrophages, natural killer cells, dendritic cells, monocytes, neutrophils, basophils, and eosinophils. These cells are always ready to fight off pathogens and work hard to destroy the foreign invaders.
- Actions of the innate immune system cells
  - Dendritic Cells: Ingest pathogen and help activate the adaptive immune system by presenting their antigen to Helping T-Cells and killer T-Cells.

  - Neutrophils: Migrate from the bloodstream to ingest and kill bacteria and fungi and recruit more immune cells.
  - Macrophages: Known as the “big eaters”, they ingest pathogens and dead cells and help activate the adaptive immune system by presenting their antigen. They also recruit more immune cells.
  - Mast Cells: launch inflammatory response and recruit macrophages and neutrophils.
  - Natural Killer cells: Detect and kill tumor or virus infected cells.
  - Basophils: Defend against parasites and contribute to inflammatory response.
  - Eosinophils: Kill bacteria and parasites.
- The innate immune cells alert the whole body that there is a problem by activating the inflammatory response and initiating the adaptive immune system.
- The inflammatory response brings swelling, pain and higher temperature, which attracts more cells to the site of infection. This means more immune cells join the fight to destroy the pathogen.
- The innate immune cells provide important information to the adaptive immune cells to “train” the adaptive immune cells how to destroy the pathogen.
- Training the adaptive immune cells is done in two ways, by releasing cytokines and displaying the pathogens antigens.
  - Cytokines are signals that tell cells what to do and where to go. Your body responds to threats in different ways depending on the cytokine signal released by your immune cells.
  - The antigen is displayed when the innate immune cells capture and breakdown the invader.
  - Together, the cytokines and antigens train individual adaptive immune cells to recognize and destroy specific patterns of each foreign invader.
- The Adaptive Immune System Cells
  - Helper and killer T-Cells are activated after the Dendritic cells engulf the pathogen.
  - When the helper T-Cells create B-Cells they are initiating the adaptive immune system.
  - Antibodies, B Cells, are then produced that attach to the pathogen.
  - The B Cells divide to produce plasma and memory cells.
  - If the same pathogen invades again, the memory cells help the immune system activate much quicker.
- When the adaptive cells are “trained” how to fight a specific antigen, they remember how to fight it, thus the next time that this pathogen tries to infect you your adaptive immune cells will remember it and destroy it quickly.
- The ability of the immune system to remember previous pathogens is commonly called adaptive or acquired immunity and is the basis for vaccines.
- However, pathogens really want to live and they can be tricky. Some pathogens, including those that cause flu, strep throat, and malaria, can mutate and change the way they look to your immune system over time by changing their antigen markers thus disguising themselves marking it harder for your immune system to recognize the mutated germs even though you’ve been exposed to them before. This is why you can get sick from flu, strep throat, or COVID multiple times.

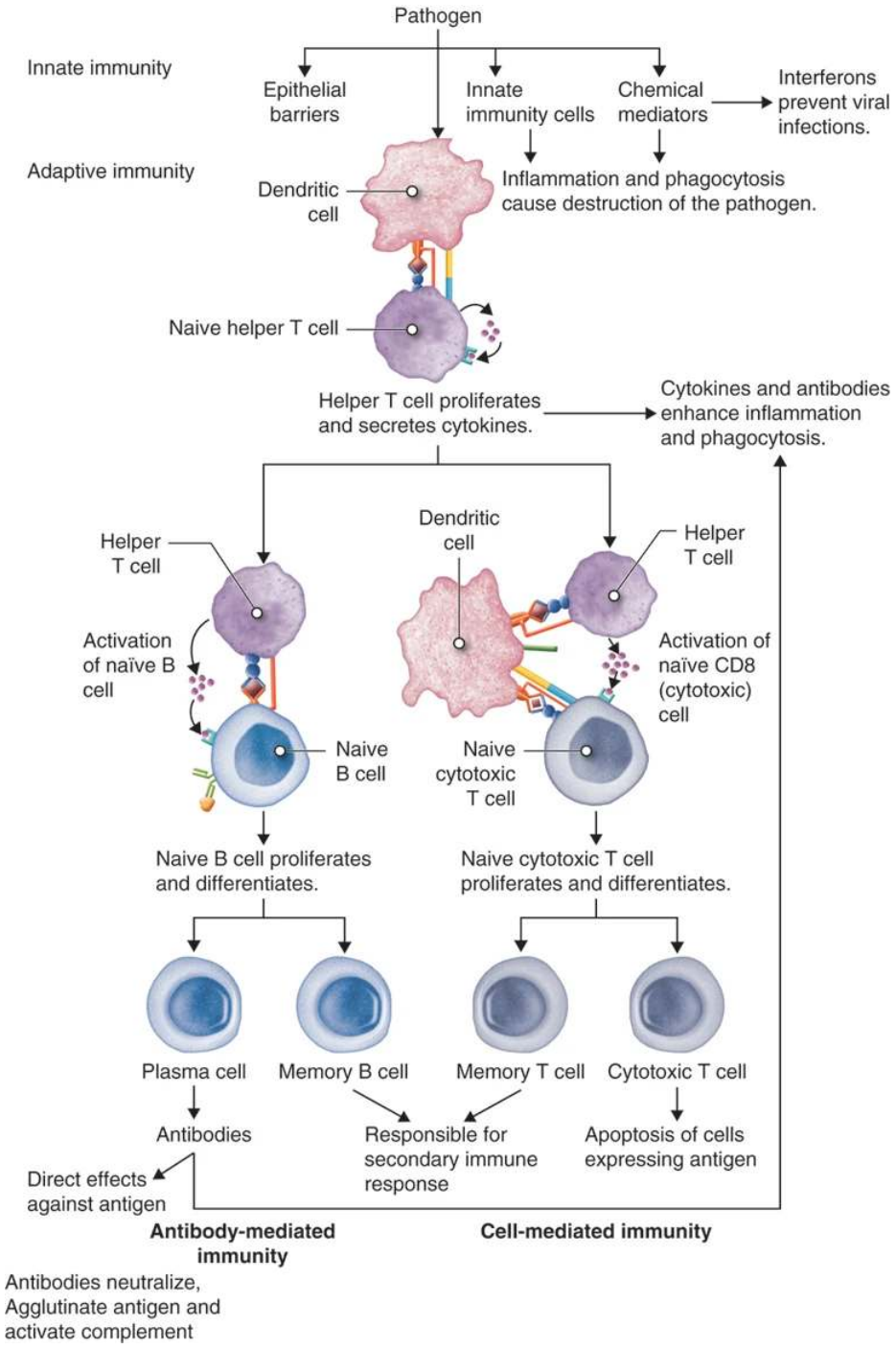


Figure 1.13.1.5 : Overview of Innate and Adaptive Immunity

Vaccines

It is possible to acquire adaptive immunity naturally or artificially. Natural immunity results from natural exposure to an antigen. For example, someone sneezes the influenza virus into the air and then it is breathed into another person's nasal passageway. However, artificial immunity refers to deliberately introducing an antigen into an individual to stimulate an immune response, known as a vaccine. Whether you have been introduced to a pathogen naturally or artificially the end result is the same, to develop memory cells to acquire immunity against the pathogen.

If the immune system did not have the ability to remember pathogens then vaccines would not work; vaccines are effective because of memory cells. The mechanism underlying vaccination is that exposure of the adaptive immune system to a small dose of an antigen will produce an initial immune response. More importantly, this small dose of antigen establishes a population of memory

T and B cells that will live long-term in the body. When that antigen is encountered again, the immune system is already primed. Upon a subsequent exposure, a more robust and faster response is established and the pathogen is destroyed faster. Vaccines can either prevent or decrease the severity of infections.

There are several different types of vaccines and even more types of vaccines in development. Each type is designed to teach your immune system how to fight off certain kinds of germs—and the serious diseases they cause. When scientists create vaccines, they consider how your immune system responds to the germ, who needs to be vaccinated against the germ, and the best technology or approach to create the vaccine.

Table 1.13.1.3 : Vaccine Types, Characteristics, and Protections from Disease

Vaccine Type	Characteristics	Vaccine Protects against
Inactivated vaccines	• Inactivated vaccines use the killed version of the germ that causes a disease. • Inactivated vaccines usually don't provide immunity (protection) that's as strong as live vaccines. So you may need several doses over time (booster shots) in order to get ongoing immunity against diseases.	• Hepatitis A • Flu (shot only) • Polio • (shot only)Rabies
Live-attenuated vaccines	• Live vaccines use a weakened (or attenuated) form of the germ that causes a disease. • Because these vaccines are so similar to the natural infection that they help prevent, they create a strong and long-lasting immune response. Just 1 or 2 doses of most live vaccines can give you a lifetime of protection against a germ and the disease it causes. • But live vaccines also have some limitations. For example: ◦ Because they contain a small amount of the weakened live virus, some people should talk to their health care provider before receiving them, such as people with weakened immune systems, long-term health problems, or people who've had an organ transplant. ◦ They need to be kept cool, so they don't travel well. That means they can't be used in countries with limited access to refrigerators.	• Measles, mumps, rubella (MMR combined vaccine) • Rotavirus • Smallpox • Chickenpox • Yellow fever

Vaccine Type	Characteristics	Vaccine Protects against
Messenger RNA (mRNA) vaccines	• Researchers have been studying and working with mRNA vaccines for decades and this technology was used to make some of the COVID-19 vaccines. • mRNA vaccines make proteins in order to trigger an immune response. • mRNA vaccines have several benefits compared to other types of vaccines, including shorter manufacturing times and, because they do not contain a live virus, no risk of causing disease in the person getting vaccinated.	• COVID-19
Subunit, recombinant, polysaccharide, and conjugate vaccines	• Subunit, recombinant, polysaccharide, and conjugate vaccines use specific pieces of the germ—like its protein, sugar, or capsid (a casing around the germ). • Because these vaccines use only specific pieces of the germ, they give a very strong immune response that's targeted to key parts of the germ. They can also be used on almost everyone who needs them, including people with weakened immune systems and long-term health problems. • One limitation of these vaccines is that you may need booster shots to get ongoing protection against diseases.	• Hib (Haemophilus influenzae type b) disease • Hepatitis BHPV (Human papillomavirus) • Whooping cough (part of the DTaP combined vaccine) • Pneumococcal disease • Meningococcal disease • Shingles
Toxoid vaccines	• Toxoid vaccines use a toxin (harmful product) made by the germ that causes a disease. They create immunity to the parts of the germ that cause a disease instead of the germ itself. That means the immune response is targeted to the toxin instead of the whole germ.Like some other types of vaccines, you may need booster shots to get ongoing	• Diphtheria • Tetanus

Vaccine Type	Characteristics	Vaccine Protects against
Viral vector vaccines	• For decades, scientists studied viral vector vaccines. Some vaccines recently used for Ebola outbreaks have used viral vector technology, and a number of studies have focused on viral vector vaccines against other infectious diseases such as Zika, flu, and HIV. Scientists used this technology to make COVID-19 vaccines as well. • Viral vector vaccines use a modified version of a different virus as a vector to deliver protection. Several different viruses have been used as vectors, including influenza, vesicular stomatitis virus (VSV), measles virus, and adenovirus, which causes the common cold. Adenovirus is one of the viral vectors used in some COVID-19 vaccines being studied in clinical trials.	• Ebola • COVID-19
DNA vaccines	• In development. • Easy and inexpensive to make—and they produce strong, long-term immunity.	In development. No vaccines available yet.
Recombinant vector vaccines (platform-based vaccines)	• In development • Act like a natural infection, so they're especially good at teaching the immune system how to fight germs.	In development. No vaccines available yet.

There is another way to get temporary immunity and that is called passive immunity, which is when antibodies are provided to the person from a donor recipient, for example from a mother to child as antibodies move across the placenta before birth. Passive immunity is not long-lasting because the individual does not produce memory cells.

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1.13.2: Sexually Transmitted Diseases (STD'S)

There are approximately 20 different infections that are known to be transmitted through sexual contact. One in five people in the U.S. has an STD. While sexually transmitted diseases (STDs) affect individuals of all ages, STDs take a particularly heavy toll on young people. CDC estimates that youth ages 15-24 account for almost half of the 26 million new sexually transmitted infections that occurred in the United States in 2018.

Many cases of chlamydia, gonorrhea, and syphilis continue to go undiagnosed and unreported, and data on several additional STDs — such as human papillomavirus, herpes simplex virus, and trichomoniasis — are not routinely reported to CDC. Many STD's are asymptomatic, meaning they do not show any symptoms, yet can still be spread to sexual partners. As a result, the CDC data on rates of STD's only captures a fraction of the true burden of STDs in America. However, it provides important insights into the scope, distribution, and trends in STD diagnoses in the country.

Table

Year			
Rate of Syphilis	Rate of Chlamydia	Rater of Gonorrhea	
1985	28.4	17.4	383
1990	54.3	160.2	276.4
1995	26	187.8	147.5
2000	11.2	251.4	128.7
2005	11.2	329.4	114.6
2010	14.8	423.6	100.2
2015	23.2	475	123
2020	40.8	481.3	206.5

It is important to understand the risk factors and symptoms of STD's in order to protect yourself and your partners. It is also important to understand the impacts to your health if you do not get treatment.

Women who do not get treatment for STD's can get Pelvic Inflammatory Disease (PID). PID is a serious condition which left untreated can cause scar tissue and abscesses to develop in the reproductive tract which can lead to permanent damage to the reproductive organs. PID can cause ectopic pregnancy (in which the fetus develops in abnormal places outside of the womb, a condition that can be life-threatening) and infertility.

For more detailed information, review the CDC fact sheet for Pelvic Inflammatory Disease (PID

Partners who do not get treated for an STD can be at an increased risk of contracting or spreading HIV/AIDS. If you get an STD and you have a sore or break in the skin from the STD, this may allow HIV to more easily enter your body and people who have HIV are more likely to spread HIV if they have an STD. The same behaviors and circumstances that may put you at risk for getting an STD also can put you at greater risk for getting HIV. In addition, having a sore or break in the skin from an STD may allow HIV to more easily enter your body. If you are sexually active, get tested for STDs and HIV regularly, even if you don't have symptoms.

For more detailed information, review the CDC fact sheet for HIV/AIDS & STDs

Bacterial Vaginosis

Bacterial vaginosis (BV) is a condition that happens when there is too much of certain bacteria in the vagina. This changes the normal balance of bacteria in the vagina. BV is the most common vaginal condition in women ages 15-44.

Researchers do not know the cause of BV. However, we do know the condition most often occurs in those who are sexually active. BV is a result of an imbalance of "good" and "harmful" bacteria in a vagina. Douching, not using condoms, and having new or multiple sex partners can upset the normal balance of vaginal bacteria, increasing your risk for getting BV.

We also do not know how sex causes BV. There also is no research to show that treating a sex partner affects whether someone gets BV. Having BV can increase your chances of getting other STDs.

BV rarely affects those who have never had sex.

You cannot get BV from toilet seats, bedding, or swimming pools.

Many people with BV do not have symptoms. If you do have symptoms, you may notice:

- A thin white or gray vaginal discharge;
- Pain, itching, or burning in the vagina;
- A strong fish-like odor, especially after sex;
- Burning when peeing; and
- Itching around the outside of the vagina.

For more detailed information, review the CDC fact sheet for Bacterial Vaginosis (BV)

Chlamydia

Chlamydia is a common bacterial STD that can cause infection among both men and women. It can cause permanent damage to a woman's reproductive system. This can make it difficult or impossible to get pregnant later. Chlamydia can also cause a potentially fatal ectopic pregnancy (pregnancy that occurs outside the womb).

You can get chlamydia by having vaginal, anal, or oral sex with someone who has chlamydia. Also, you can still get chlamydia even if your sex partner does not ejaculate (cum). A pregnant person with chlamydia can give the infection to their baby during childbirth.

Chlamydia often has no symptoms, but it can cause serious health problems, even without symptoms. If symptoms occur, they may not appear until several weeks after having sex with a partner who has chlamydia.

Even when chlamydia has no symptoms, it can damage a woman's reproductive system.

Women with symptoms may notice:

- An abnormal vaginal discharge; and
- A burning sensation when peeing.

Symptoms in men can include:

- A discharge from their penis;
- A burning sensation when peeing; and
- Pain and swelling in one or both testicles (although this is less common).

Men and women can also get chlamydia in their rectum. This happens either by having receptive anal sex, or by spread from another infected site (such as the vagina). While these infections often cause no symptoms, they can cause

- Rectal pain;
- Discharge; and
- Bleeding.

See a healthcare provider if you notice any of these symptoms. You should also see a provider if your partner has an STD or symptoms of one. Symptoms can include

- An unusual sore;
- A smelly discharge;
- Burning when peeing; or
- Bleeding between periods.

For more detailed information, review the CDC fact sheet for Chlamydia

Gonorrhea

Gonorrhea is is a common bacterial STD that can cause infection in the genitals, rectum, and throat. It is very common, especially among young people ages 15-24 years.

You can get gonorrhea by having vaginal, anal, or oral sex with someone who has gonorrhea. A pregnant person with gonorrhea can give the infection to their baby during childbirth.

Gonorrhea often has no symptoms, but it can cause serious health problems, even without symptoms.

Most women with gonorrhea do not have any symptoms. Even when a woman has symptoms, they are often mild and can be mistaken for a bladder or vaginal infection.

Symptoms in women can include:

- Painful or burning sensation when peeing;
- Increased vaginal discharge; and
- Vaginal bleeding between periods.

Men who do have symptoms may have:

- A burning sensation when peeing;
- A white, yellow, or green discharge from the penis; and
- Painful or swollen testicles (although this is less common).

Rectal infections may either cause no symptoms or cause symptoms in both men and women that may include:

- Discharge;
- Anal itching;
- Soreness;
- Bleeding; and
- Painful bowel movements.

See your healthcare provider if you notice any of these symptoms. You should also see a provider if your partner has an STD or symptoms of one. Symptoms can include an unusual sore, a smelly discharge, burning when peeing, or bleeding between periods.

For more detailed information, review the CDC fact sheet for Gonorrhea

Genital Herpes

Genital herpes is common viral STD in the United States. In 2018, CDC estimates show there were 572,000 new genital herpes infections in the United States among people aged 14 to 49.

HSV-1 often causes oral herpes, which can result in cold sores or fever blisters on or around the mouth. HSV-1 is typically acquired during childhood, is very common, and often has no symptoms. HSV-2 is a sexually transmitted disease that causes genital herpes. Oral herpes caused by HSV-1 can spread from the mouth to the genitals through oral sex, thus Genital herpes is an STD that can be caused by two types of viruses – herpes simplex virus type 1 (HSV-1) and herpes simplex virus type 2 (HSV-2).

You can get genital herpes by having vaginal, anal, or oral sex with someone who has the infection. You can get herpes if you have contact with:

- A herpes sore;
- Saliva from a partner with an oral herpes infection;
- Genital fluids from a partner with a genital herpes infection;
- Skin in the oral area of a partner with oral herpes; or
- Skin in the genital area of a partner with genital herpes.

You also can get genital herpes from a sex partner who does not have a visible sore or is unaware of their infection. It is also possible to get genital herpes if you receive oral sex from a partner with oral herpes.

You will not get herpes from toilet seats, bedding, or swimming pools. You also will not get it from touching objects, such as silverware, soap, or towels.

Most people with genital herpes have no symptoms or have very mild symptoms. Mild symptoms may go unnoticed or be mistaken for other skin conditions like a pimple or ingrown hair. Because of this, most people do not know they have a herpes infection.

Herpes sores usually appear as one or more blisters on or around the genitals, rectum or mouth. This is known as having an “outbreak”. The blisters break and leave painful sores that may take a week or more to heal. Flu-like symptoms (e.g., fever, body aches, or swollen glands) also may occur during the first outbreak.

For more detailed information, review the CDC fact sheet for Genital Herpes

Hepatitis

Hepatitis means inflammation of the liver. The liver is a vital organ that processes nutrients, filters the blood, and fights infections. When the liver is inflamed or damaged, its function can be affected. Heavy alcohol use, toxins, some medications, and certain medical conditions can cause hepatitis. However, hepatitis is often caused by a virus. In the United States, the most common types of viral hepatitis are hepatitis A, hepatitis B, and hepatitis C (there is also Hepatitis D and E).

Hepatitis A and B can be transmitted through sexual activity, it is less common to be infected with Hepatitis C through sexual intercourse.

For more detailed information, review the CDC fact sheet for Hepatitis

Human Papillomavirus Virus (HPV)- Genital Warts

HPV is a viral STD and the most common STD/STI. There were about 43 million HPV infections in 2018, many among people in their late teens and early 20s. There are many different types of HPV. Some types can cause health problems, including genital warts and cancers. But there are vaccines that can stop these health problems from happening. HPV is a different virus than HIV and HSV (herpes).

You can get HPV by having vaginal, anal, or oral sex with someone who has the virus. It is most commonly spread during vaginal or anal sex. It also spreads through close skin-to-skin touching during sex. A person with HPV can pass the infection to someone even when they have no signs or symptoms. If you are sexually active, you can get HPV, even if you have had sex with only one person. You also can develop symptoms years after having sex with someone who has the infection. This makes it hard to know when you first got it.

HPV can cause cervical and other cancers, including cancer of the vulva, vagina, penis, or anus. It can also cause cancer in the back of the throat (called oropharyngeal cancer). This can include the base of the tongue and tonsils. Cancer often takes years, even decades, to develop after a person gets HPV. Genital warts and cancers result from different types of HPV.

There is no test to find out a person's "HPV status." Also, there is no approved HPV test to find HPV in the mouth or throat. However, there are HPV tests that can screen for cervical cancer. Most people with HPV do not know they have the infection. They never develop symptoms or health problems from it. Some people find out they have HPV when they get genital warts. Women may find out they have HPV when they get an abnormal Pap test result (during cervical cancer screening). Others may only find out once they've developed more serious problems from HPV, such as cancers.

There is a vaccine available to prevent new HPV infections. The HPV vaccine is recommended for routine vaccination starting at age 11 or 12 years (can be started at age 9). Vaccination is not recommended for everyone older than age 26 years, however adults ages 27 through 45 years might decide to get the HPV vaccine based on discussion with their clinician, if they did not get adequately vaccinated when they were younger.

For more detailed information, review the CDC fact sheet for Human Papillomavirus (HPV

Syphilis

Syphilis is a bacterial sexually transmitted infection (STI) that can cause serious health problems without treatment. Infection develops in stages (primary, secondary, latent, and tertiary). Each stage can have different signs and symptoms.

You can get syphilis by direct contact with a syphilis sore during vaginal, anal, or oral sex. You cannot get syphilis through casual contact with objects, such as toilet seats or doorknobs.

Syphilis can spread from a mother with syphilis to her unborn baby.

There are four stages of syphilis (primary, secondary, latent, and tertiary). Each stage has different signs and symptoms. Without treatment, syphilis can spread to the brain and nervous system (neurosyphilis), the eye (ocular syphilis), or the ear (otosyphilis) during any of the four stages.

- Primary Stage
  - During the first (primary) stage of syphilis, you may notice a single sore or multiple sores. The sore is the location where syphilis entered your body. These sores usually occur in, on, or around the penis, vagina, anus, rectum, or mouth.
  - Sores are usually (but not always) firm, round, and painless. Because the sore is painless, you may not notice it. The sore usually lasts 3 to 6 weeks and heals regardless of whether you receive treatment.

    - Even after the sore goes away, you must still receive treatment. This will stop your infection from moving to the secondary stage.
- Secondary Stage
    - During the secondary stage, you may have skin rashes and/or sores in your mouth, vagina, or anus.
    - This stage usually starts with a rash on one or more areas of your body. The rash can show up when your primary sore is healing or several weeks after the sore has healed. The rash usually won't itch and can be on the palms of your hands and/or the bottoms of your feet and look rough, red, or reddish-brown.
    - Other symptoms may include fever, swollen lymph nodes, sore throat, patchy hair loss, headaches, weight loss, muscle aches, and fatigue.
    - The symptoms from this stage will go not away unless you receive treatment. Without the right treatment, your infection will move to the latent and possibly tertiary stages of syphilis.
- Latent Stage
    - The latent stage of syphilis is a period when there are no visible signs or symptoms. Without treatment, you can continue to have syphilis in your body for years.
- Tertiary Stage
    - Most people with untreated syphilis do not develop tertiary syphilis. However, when it does happen, it can affect many different organ systems. These include the heart and blood vessels, and the brain and nervous system. Tertiary syphilis is very serious and would occur 10–30 years after your infection began. In tertiary syphilis, the disease damages your internal organs and can result in death. A healthcare provider can usually diagnose tertiary syphilis with the help of multiple tests.

For more detailed information, review the CDC fact sheet for Syphilis

Trichomoniasis

Trichomoniasis (or "trich") is a very common STD caused by infection with Trichomonas vaginalis (a protozoan parasite). Although symptoms vary, most people who have trich cannot tell they have it.

Sexually active people can get trich by having sex without a condom with a partner who has trich.

In women, the infection is most commonly found in the lower genital tract (vulva, vagina, cervix, or urethra). In men, the infection is most commonly found inside the penis (urethra). During sex, the parasite usually spreads from a penis to a vagina, or from a vagina to a penis. It can also spread from a vagina to another vagina.

It is not common for the parasite to infect other body parts, like the hands, mouth, or anus. It is unclear why some people with the infection get symptoms while others do not. It probably depends on factors like a person's age and overall health. People with trich can pass the infection to others, even if they do not have symptoms.

About 70% of people with the infection do not have any signs or symptoms. When trich does cause symptoms, they can range from mild irritation to severe inflammation. Some people get symptoms within 5 to 28 days after getting the infection. Others do not develop symptoms until much later. Symptoms can come and go.

Men with trich may notice:

- Itching or irritation inside the penis;
- Burning after peeing or ejaculating; and
- Discharge from the penis.

Women with trich may notice:

- Itching, burning, redness or soreness of the genitals;
- Discomfort when peeing; and
- A clear, white, yellowish, or greenish vaginal discharge (i.e., thin discharge or increased volume) with a fishy smell.

Having trich can make sex feel unpleasant. Without treatment, the infection can last for months or even years.

For more detailed information, review the CDC fact sheet for Trichomoniasis

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1.13.3: End-of-Chapter Material

Key takeaways for this Chapter

- The immune system is constantly working to keep you healthy.
- There are about 1,400 known pathogens that cause disease in humans.
- There are steps you can take to break the chain of infection and stop disease transmission.
- The bodies first barrier to disease are the physical and chemical barriers.
- The innate and adaptive immune system work in tandem to protect you.
- The immune system has an incredible ability to remember past infections.
- The ability to remember pathogens is the foundation for Vaccines
- There are several different types of vaccines.
- STD's are very common
- Most STDs are asymptomatic.

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1.13.4: Protecting Health- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

Can you actually boost your immune system? Here's the truth



How mRNA medicine will change the world



How we study the microbes living in your gut



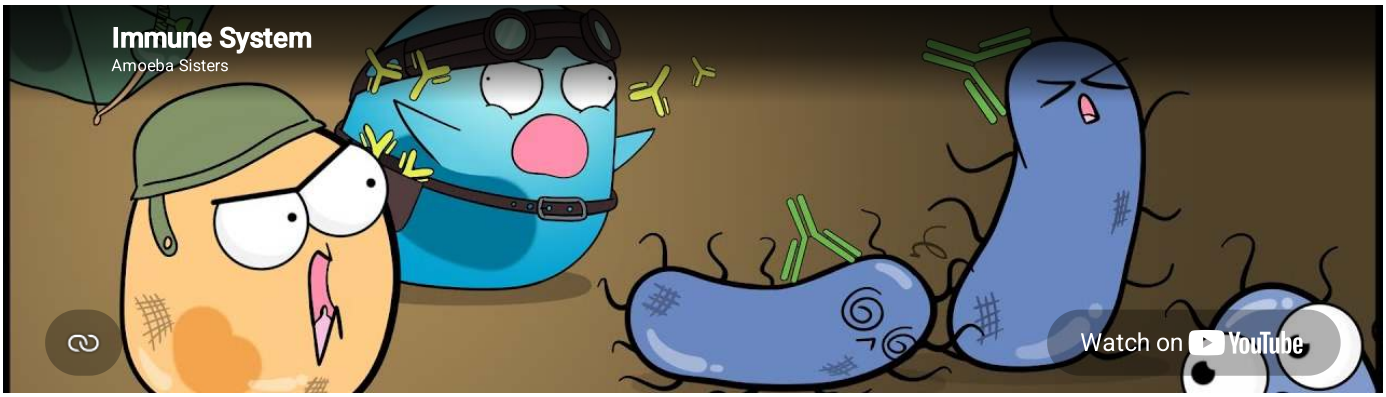
Insights on HIV, in stunning data visuals



Sex, drugs and HIV — let's get rational



The Immune System





Ugly History: The US syphilis experiment



We're covered in germs. Let's design for that.



What is HPV and how can you protect yourself from it?



Which is better: Soap or hand sanitizer?



Why it's so hard to cure HIV/AIDS



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SECTION OVERVIEW

1.14: Making Smart Health Choices

Learning Objectives

By the end of this chapter you will be able to:

- Deduce whether health information is valid and reliable.
- Utilize tools to critically analyze health websites.
- Compare complementary and western medicine.
- Explain common challenges associated with Aging.

What will you do to make sure you are not tricked by health fraud?

Have you considered being an organ donor?

How will you plan for retirement?

What will you do to stay healthy as you age?

Every year we get one year older chronologically, does this mean we also get one year older biologically? Our biological age is the age of our body and this is not dependent on our chronological age. You can be a 30 year old who is very healthy and has a biological age closer to 20 year old, or you can be a 30 year old who lives an unhealthy lifestyle and has a biological age closer to 40. Our biological age is highly influenced by the lifestyle choices we make.

In 1900, people lived on average just 47.3 years and by the year 2000, Americans lived an average of 76.8 years. Life expectancy nearly doubled in just 100 years. The leading causes of death in 1900 were highly related to infectious disease. Through numerous public health measures life expectancy has drastically increased and the leading causes of death have transitioned to be more related to a persons lifestyle choices.

The good news is that Americans are living longer lives, but the bad news is that the increase in our older population brings an increase in chronic diseases, such as hypertension, diabetes, arthritis, and dementia. It is estimated that 80% of older adults have a chronic health condition. With so many older adults having chronic health conditions we know there will continue to be an increased need for caregivers. This creates a potential problem because although our older population is growing, or birth rates are declining which may reduce the amount of people to serve as caretakers.

1.14.1: Health Literacy

1.14.2: Healthcare

1.14.3: Health Care Choices - The Affordable Health Care Act (ACA)

1.14.4: Health Insurance - Key Terms

1.14.5: Choices in Medical Care

1.14.6: Health Disparity

1.14.7: Aging

1.14.8: Dealing with Death

1.14.9: End-of-Chapter Material

1.14.10: Health Care and Aging- Optional Continued Learning

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1.14.1: Health Literacy

Chapter one of this book provided a brief introduction to health literacy, this chapter expands on the importance of critically consuming health information throughout your life and as you age. The CDC defines personal health literacy as the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

Finding reliable health information

Millions of consumers get health information from magazines, TV or the Internet. Some of the information is reliable and up to date; some is not. How can you tell the good from the bad to make sure you are making your own health decisions based on the best information?

First, recognize that content on the Internet is unregulated; anyone can publish anything on the Internet. There is sound medical information on the Internet along with dangerous information. You need to be able to tell the difference.

Ask yourself the following:

- Why did the person create the page?
- What's in it for them?
- Are they trying to sell me something?

The following tips can help you to find current, unbiased information based on research[1].

- Consider the source–Use recognized authorities
  - Know who is responsible for the content.
  - Look for an "about us" page. Check to see who runs the site: is it a branch of the Federal Government, a non-profit institution, a professional organization, a health system, a commercial organization or an individual.
  - There is a big difference between a site that says, "I developed this site after my heart attack" and one that says, "This page on heart attack was developed by health professionals at the American Heart Association."
  - Web sites should have a way to contact the organization or webmaster. If the site provides no contact information, or if you can't easily find out who runs the site, use caution.
- Focus on quality–All Web sites are not created equal
  - Does the site have an editorial board? Is the information reviewed before it is posted?
  - This information is often on the "about us" page, or it may be under the organization's mission statement, or part of the annual report.
  - See if the board members are experts in the subject of the site. For example, a site on osteoporosis whose medical advisory board is composed of attorneys and accountants is not medically authoritative.
  - Look for a description of the process of selecting or approving information on the site. It is usually in the "about us" section and may be called "editorial policy" or "selection policy" or "review policy."
  - Sometimes the site will have information "about our writers" or "about our authors" instead of an editorial policy. Review this section to find out who has written the information.
- Be a cyber skeptic–Quackery abounds on the Web
  - Does the site make health claims that seem too good to be true? Does the information use deliberately obscure, "scientific" sounding language? Does it promise quick, dramatic, miraculous results? Is this the only site making these claims?
  - Beware of claims that one remedy will cure a variety of illnesses, that it is a "breakthrough," or that it relies on a "secret ingredient."
  - Use caution if the site uses a sensational writing style (lots of exclamation points, for example.)
  - A health Website for consumers should use simple language, not technical jargon.
  - Get a second opinion! Check more than one site.
- Look for the evidence–Rely on medical research, not opinion
  - Does the site identify the author? Does it rely on testimonials?
  - Look for the author of the information, either an individual or an organization. Good examples are "Written by Jane Smith, R.N.," or "Copyright 2013, American Cancer Society."

- If there are case histories or testimonials on the Web site, look for contact information such as an email address or telephone number. If the testimonials are anonymous or hard to track down (“Jane from California”), use caution.

- Check for currency–Look for the latest information
  - Is the information current?
  - Look for dates on documents. A document on coping with the loss of a loved one doesn’t need to be current, but a document on the latest treatment of AIDS needs to be current.
  - Click on a few links on the site. If there are a lot of broken links, the site may not be kept up-to-date.
- Beware of bias–What is the purpose? Who is providing the funding?
  - Who pays for the site?
  - Check to see if the site is supported by public funds, donations or by commercial advertising.
- Advertisements should be labeled. They should say “Advertisement” or “From our Sponsor.”
  - Look at a page on the site, and see if it is clear when content is coming from a non-commercial source and when an advertiser provides it. For example, if a page about treatment of depression recommends one drug by name, see if you can tell if the company that manufactures the drug provides that information. If it does, you should consult other sources to see what they say about the same drug.
- Protect your privacy–Health information should be confidential
  - Does the site have a privacy policy and tell you what information they collect?
  - There should be a link saying “Privacy” or “Privacy Policy.” Read the privacy policy to see if your privacy is really being protected. For example, if the site says “We share information with companies that can provide you with useful products,” then your information isn’t private.
  - If there is a registration form, notice what types of questions you must answer before you can view content. If you must provide personal information (such as name, address, date of birth, gender, mother’s maiden name, credit card number) you should refer to their privacy policy to see what they can do with your information.
- Consult with your health professional–Patient/provider partnerships lead to the best medical decisions.

Health Fraud

When you see statements like “miracle cure,” “revolutionary scientific breakthrough,” or “alternative to drugs or surgery,” what you should be thinking is, “bogus product,” “Danger,” or “Health fraud alert!”

Health fraud scams have been around for hundreds of years[2]. The snake oil salesmen of old have morphed into the deceptive, high-tech marketers of today. They prey on people’s desires for easy solutions to difficult health problems, from losing weight to curing serious diseases like cancer. According to the Food and Drug Administration (FDA), a health product is fraudulent if it is deceptively promoted as being effective against a disease or health condition but has not been scientifically proven safe and effective for that purpose. Health fraud scams can do more than waste your money, they can cause serious injury or even death.

Scammers promote their products through newspapers, magazines, TV infomercials and cyberspace. You can find health fraud scams in retail stores and on countless websites, in popup ads and spam, and on social media sites like Facebook and Twitter. It is important to understand the signs of fraudulent health product.

The FDA provides the following list of 6 Tip-offs to Rip-offs:

1. One product does it all. Be suspicious of products that claim to cure a wide range of diseases. The agency continues to send warning letters and take enforcement action as appropriate against companies marketing fake cure-all products. These miracle cures don’t exist – they’re bogus – and the only thing these companies are selling is false hope.
2. Personal “success” testimonials. Success stories, such as, “It cured my diabetes” or “It immediately stopped my COVID-19 infection,” are easy to make up and are not a substitute for scientific evidence. Reviews found on popular online marketplaces and social media can be fake.
3. Quick fixes. Few diseases or conditions can be treated quickly, even with legitimate products. Beware of language such as, “Lose 30 pounds in 30 days,” “protects from viral infections,” or “eliminates skin cancer in days.”
4. “All natural” cure or treatment. Don’t be fooled by descriptions like “all-natural cure.” Such phrases are often used in health fraud as an attention-grabber to suggest that a product is safer than conventional treatments. These terms don’t necessarily equate to safety. Some plants found in nature (such as poisonous mushrooms) can be harmful or even kill when consumed.

Moreover, the FDA has found numerous products promoted as “all-natural” cures or treatments that contain hidden and dangerously high doses of prescription drug ingredients or other active pharmaceutical ingredients.

5. “Miracle cure.” Alarms should go off when you see this claim or others like it such as, “new discovery,” “guaranteed results,” or “secret ingredient.” If a real cure for a serious disease were FDA-approved, it would be widely reported through the media and prescribed by licensed health professionals—not plastered on advertisements in social media and messaging apps, or buried in websites, print ads, and TV infomercials.
6. Conspiracy theories. Claims like “This is the cure our government or Big Pharma doesn’t want you to know about” are used to distract consumers from the obvious, common-sense questions about the so-called miracle cure.

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1.14.2: Healthcare

Health Insurance in the U.S.

No one plans to get sick or hurt, but most people need medical care at some point. Health insurance covers essential health benefits critical to maintaining your health and treating illness and accidents, for example getting free preventive care, like vaccines, screenings, and some check-ups, even before you meet your deductible. Health insurance protects you from unexpected, high medical costs by paying less for covered in-network health care, even before you meet your deductible. People without health coverage are exposed to these costs, which can sometimes lead into extreme debt or even into bankruptcy.

The U.S. does not have universal health coverage, meaning the government does not provide health insurance for every person, rather the U.S. health system is a mix of public and private, for-profit and nonprofit insurers and health care providers[5]. The federal government provides Medicare, medicaid and the Children's Health Insurance Program (CHIP). Private insurance is provided primarily by employers and people can also purchase their own health insurance coverage. Although there are options for health insurance, there are still about 8.5% of Americans who are un-insured, which is a reduction from 16% in 2010 before the passing of the Patient Protection and Affordable Care Act.

Medicare is health insurance for:

- People 65 or older (eligible to sign up for Medicare 3 months before turning 65)
- Those with a disability, End-Stage Renal Disease (ESRD), or ALS (also called Lou Gehrig's disease) may be able to sign up before 65.

Medicaid is a joint federal and state program that:

- Helps with medical costs for some people with limited income and resources.
- Offers benefits not normally covered by Medicare, like nursing home care and personal care services.

The Children's Health Insurance Program (CHIP) is a joint federal and state program that:

- provides health coverage to eligible children, through both Medicaid and separate CHIP programs.

Managed Care Plans

- Managed care plans are a type of health insurance. They have contracts with health care providers and medical facilities to provide care for members at reduced costs. These providers make up the plan's network. How much of your care the plan will pay for depends on the network's rules.
  - With an Health Maintenance Organizations (HMO) you choose a primary care doctor who coordinates most of your care. HMO's usually only pay for care within their specified network of doctors/providers. HMO plans typically have lower monthly premiums. You can also expect to pay less out of pocket.
  - With a Preferred Provider Organizations (PPO) you tend to have higher monthly premiums in exchange for the flexibility to use providers both in and out of network without a referral. Out-of-pocket medical costs can also run higher with a PPO plan.
  - Point of Service (POS) plans let you choose between an HMO or a PPO each time you need care.

If you're unemployed, or your employer does not provide health insurance, you may be able to get an affordable health insurance plan through the Health Insurance Marketplace. The Health Insurance Marketplace was developed in response to the Patient Protection and Affordable Care Act passed in 2010. Its primary goal is to achieve universal health insurance coverage by facilitating cooperation among employers, citizens, and the government. Its other objectives are to make healthcare more affordable while simultaneously increasing healthcare quality and reducing unnecessary spending[6].

The Affordable Care Act (ACA) created a dramatically different marketplace for individual health insurance through three key reforms: prohibiting insurers from considering subscribers' health status or risk; providing substantial subsidies for millions of people to purchase individual coverage, many for the first time in their lives; and creating an "exchange" structure that facilitates comparison shopping. Due to the ACA the uninsured rate has dropped from 16 percent in 2010 to 8.5%.

Universal Healthcare

The World Health Organization states that:

- Half of the world's population do not have access to the health care they need.

- 100 million people are driven into poverty each year through out-of-pocket health spending.
- 75% of national health policies strategies and plans are aimed at moving towards universal health coverage.
- Over 930 million people spend at least 10% of their household income on health care.

In an effort to bring healthcare to all people across the world, The World Health Organization (WHO) is encouraging all countries of the world to adopt Universal Health Coverage (UHC). The WHO is providing support and technical expertise to advance universal health coverage in 115 countries, representing a population of at least 3 billion people. The goal is to bridge global commitments with country action to achieve universal health coverage.

The WHO defines universal healthcare as “ensuring that all people have access to needed health services (including prevention, promotion, treatment, rehabilitation and palliation) of sufficient quality to be effective while also ensuring that the use of these services does not expose the user the financial hardship. It includes the full range of essential health services, from health promotion to prevention, treatment, rehabilitation, and palliative care.”

Many countries offer universal healthcare, these include:

- Australia (Healthcare System in Australia)
- Canada (Canadian Health Care System)
- France (French Healthcare System)
- Germany (German Healthcare System – GKV)
- Ireland (Healthcare System in Ireland)
- Italy (Healthcare System in Italy)
- Japan (Japanese Healthcare System)
- New Zealand (New Zealand’s Healthcare System)
- Portugal (Healthcare System in Portugal)
- Spain (Healthcare System in Spain)
- Sweden (Sweden’s Healthcare System)
- United Kingdom (Healthcare System in the UK)

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1.14.3: Health Care Choices - The Affordable Health Care Act (ACA)

Health care choices in the United States can be broadly divided into two main categories: public health care (government-funded) and private health care (privately funded). The two main publicly funded health care programs are Medicare, which provides health services to people over 65 years old as well as people who meet other standards for disability, and Medicaid, which provides services to people with very low incomes who meet other eligibility requirements. Other government-funded programs include service agencies focused on Native Americans (the Indian Health Service), Veterans (the Veterans Health Administration), and children (the Children's Health Insurance Program).

Health care in the United States is a complex issue, and it will remain complex with the continued enactment of the Patient Protection and Affordable Care Act (PPACA). This Act, sometimes called "ObamaCare" for its most noted advocate, former President Barack Obama, represents large-scale federal reform of the United States' health care system. It expands eligibility to programs like Medicaid and CHIP, helps guarantee insurance coverage for people with pre-existing conditions, and establishes regulations to make sure that the premium funds collected by insurers and care providers go directly to medical care. It also includes an individual mandate, which requires everyone to have insurance coverage or pay a penalty. A series of provisions, including significant subsidies, are intended to address the discrepancies in income that are currently contributing to high rates of uninsurance and underinsurance.

How much do you know the Affordable Health Care Act?

You need to be fully informed about what the PPACA provides. Here is a list of key changes to the United States health care system as a result of the PPACA:

- Insurers are prohibited from denying coverage to individuals due to pre-existing conditions.
- Premiums must be the same for everyone of a given age, regardless of preexisting conditions.
- Dependents are permitted to remain on their parents' insurance plan until their 26th birthday.
- Individuals are required to buy health insurance or pay a penalty (known as the individual mandate). This applies to everyone not covered by an employer sponsored health plan, Medicaid, Medicare or other public insurance programs (such as Tricare). Also exempt were those facing a financial hardship or who were members in a recognized religious sect exempted by the Internal Revenue Service.
- Essential health benefits must be provided. The National Academy of Medicine defines the law's "essential health benefits" as "ambulatory patient services; emergency services; hospitalization; maternity and newborn care; mental health and substance use disorder services, including behavioral health treatment; prescription drugs; rehabilitative services and devices; laboratory services; preventive and wellness services and chronic disease management; and pediatric services, including oral and vision care" and others rated Level A or B by the U.S. Preventive Services Task Force. In determining what would qualify as an essential benefit, the law required that standard benefits should offer at least that of a "typical employer plan".
- Additional preventive care and screenings for women. This includes Well-woman visits, gestational diabetes screening for pregnant women, domestic and interpersonal violence screening and counseling, FDA-approved contraception methods, and contraceptive education and counseling, breastfeeding support, supplies, and counseling, HPV DNA testing, for women 30 or older, sexually transmitted infections counseling, and HIV screening and counseling for sexually active women. This mandate applies to all employers and educational institutions except for religious organizations. These regulations were included on the recommendations of the Institute of Medicine.
- Annual and lifetime coverage caps on essential benefits were banned.
- Prohibits insurers from dropping policyholders when they get sick.
- All health policies sold in the United States must provide an annual maximum out of pocket (MOOP) payment cap for an individual's or family's medical expenses (excluding premiums). After the MOOP payment cap is reached, the insurer must pay all remaining costs.
- Preventive care, vaccinations and medical screenings cannot be subject to co-payments, co-insurance or deductibles. Specific examples of covered services include: mammograms and colonoscopies, wellness visits, gestational diabetes screening, HPV testing, STI counseling, HIV screening and counseling, contraceptive methods, breastfeeding support/supplies and domestic violence screening and counseling.
- The law established four tiers of coverage: bronze, silver, gold and platinum. All categories offer the essential health benefits. The categories vary in their division of premiums and out-of-pocket costs: bronze plans have the lowest monthly premiums and highest out-of-pocket costs, while platinum plans are the reverse. The percentages of health care costs that plans are expected to

cover through premiums (as opposed to out-of-pocket costs) are, on average: 60% (bronze), 70% (silver), 80% (gold), and 90% (platinum).

- Insurers are required to implement an appeals process for coverage determination and claims on all new plans.
- Employer mandate. Businesses that employ 50 or more people but do not offer health insurance to their full-time employees pay a tax penalty if the government has subsidized a full-time employee's healthcare through tax deductions or other means. This is commonly known as the employer mandate. This provision was included to encourage employers to continue providing insurance once the exchanges began operating. Approximately 44% of the population was covered directly or indirectly through an employer.
- Insurers must spend at least 80–85% of premium dollars on health costs; rebates must be issued to policyholders if this is violated.

Many Americans worry that governmental oversight of health care represents a federal overstepping of constitutional guarantees of individual freedom. Others welcome a program that they believe will make health care accessible and affordable to everyone.

Watch this tour of the HealthCare.gov website to find out more.

Covered California

In California, the health care marketplace is called Covered California. This is where Californians can shop and compare health insurance plans under the Patient Protection and Affordable Care Act. The Department of Health Care Services sponsors Covered California to help health insurance shoppers get the coverage and care that is right for them. Visit CoveredCA.com for more information.

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1.14.4: Health Insurance - Key Terms

Part of health literacy is understanding key health insurance terms. This will allow for educated decisions when choosing a health insurance plan. Below are some basic key terms that are helpful to understand when researching health insurance plans:

In-Network Providers: health care providers who are contracted with your health insurance plan to provide services at a contracted or discounted rate.

Out-of-Network Providers: health care providers who are not contracted with your health insurance plan. Out-of-network coinsurance usually costs you more than in-network coinsurance because there is no contracted or discounted rate.

Exclusive Provider Organization (EPO): A managed care plan where services are covered only if you use doctors, specialists, or hospitals in the plan's network (except in an emergency).

Health Maintenance Organization (HMO): A type of health insurance plan that usually limits coverage to care from doctors who work for or contract with the HMO. It generally won't cover out-of-network care except in an emergency. An HMO may require you to live or work in its service area to be eligible for coverage. HMOs often provide integrated care and focus on prevention and wellness.

Point of Service (POS): A type of plan where you pay less if you use doctors, hospitals, and other health care providers that belong to the plan's network. POS plans require you to get a referral from your primary care doctor in order to see a specialist.

Preferred Provider Organization (PPO): A type of health plan where you pay less if you use providers in the plan's network. You can use doctors, hospitals, and providers outside of the network without a referral for an additional cost.

Premium: The amount paid for your health insurance every month. In addition to your premium, you usually have to pay other costs for your health care, including a deductible, copayments, and coinsurance.

Deductible: The amount you pay for covered health care services before your insurance plan starts to pay. With a $2,000 deductible, for example, you pay the first $2,000 of covered services yourself.

Many health insurance plans cover certain services such as check-ups, disease management, and preventive services before the deductible has been met. Family plans often have both an individual deductible, which applies to each person, and a family deductible, which applies to all family members.

Generally, plans with lower monthly premiums have higher deductibles. Plans with high monthly premiums usually have lower deductibles. Those who use their health insurance often would probably be wise to choose a plan with a slightly higher premium but a lower deductible, which may save money in the long-term.

After paying the deductible, you will usually pay only a copayment or coinsurance for covered services. Your insurance company pays the rest.

Copayment: A fixed amount ($20, for example) you pay for a covered health care service after you've paid your deductible. Let's say your health insurance plan's allowable cost for a doctor's office visit is $100. Your copayment for a doctor visit is $20. If you've paid your deductible: You pay $20, usually at the time of the visit. If you haven't met your deductible: You pay $100, the full allowable amount for the visit.

Copayments (sometimes called "copays") can vary for different services within the same plan, like drugs, lab tests, and visits to specialists.

Coinsurance: The percentage of costs of a covered health care service you pay (20%, for example) after you've paid your deductible. Let's say your health insurance plan's allowed amount for an office visit is $100 and your coinsurance is 20%. If you've paid your deductible: You pay 20% of $100, or $20. The insurance company pays the rest. If you haven't met your deductible: You pay the full allowed amount, $100.

Out-of-pocket maximum: The most you have to pay for covered services in a plan year. After you spend this amount on deductibles, copayments, and coinsurance, your health plan pays 100% of the costs of covered benefits.

Although this is not an all-encompassing list of key terms for health insurance, these are some of the terms you are likely to encounter when shopping for health insurance.

More in-depth information can be found at Healthcare.gov/glossary.

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1.14.5: Choices in Medical Care

Choosing the right medical professional can be difficult and will vary depending on your day-to-day health status. Below is a brief list of medical professionals you can visit for a variety of health issues:

Primary Care Practitioner (PCP) is a medical professional whom you can go to for routine ailments, preventive care, general medical advice, and appropriate referrals. The primary care provider for most people is a medically trained family practitioner, an internist, or a pediatrician.

Conventional or Allopathic medicine, or traditional Western medical practice, is based on scientifically validated methods and procedures and involves the application of the scientific method; cause and effect.

Complementary medicine and alternative medicine; unconventional practices used alongside or instead of conventional medicine. Examples include chiropractic's, massage therapy, acupuncture, acupressure, and herbal remedies.

Other PCP include

Osteopath: general practitioner who receives medical training similar to MD , but is more involved in musculoskeletal focus than internal focus.

Nurse practitioners are professional nurses with advanced training obtained through either a master's degree program or specialized nurse practitioner program. They have the authority and training to conduct diagnostic tests and prescribe medications (in some states). Nurses may also earn the clinical doctor of nursing degree (ND), a doctorate of nursing science (DNS or DNSc), or a research-based doctorate (PhD) in nursing.

Physician assistants must work under the supervision of a physician and are legally permitted to prescribe drugs in all states.

Other practitioners:

Nurses are highly trained and strictly regulated practitioners who provide a wide range of services including patient education, counseling, community health and disease prevention information, and administration of medications.

Licensed registered nurses (RN) have completed either a 4-year program leading to a Bachelor of Science degree (BSN) or a 2-year associate degree program.

Licensed practical or vocational nurses (LPN or LVN) have completed a one- to two-year training program.

Ophthalmologist holds a medical degree and can perform surgery. An optometrist evaluates visual problems but is not a trained physician.

Podiatrist: specialize in care of the foot; extensive training similar to MD; can prescribe and perform surgery.

Dentists are specialists who diagnose and treat diseases of the teeth, gums, and oral cavity. Orthodontists are specialists in the alignment of teeth. Oral surgeons perform surgical procedures to correct problems of the mouth, face, and jaw.

Questions are the Answer

Whichever health care professional you choose to visit, your health depends on good communication. Asking questions and providing information to your doctor and other care providers can improve your care. Quality health care is a team effort. You play an important role. One of the best ways to communicate with your doctor and health care team is by asking questions. Because time is limited during medical appointments, you will feel less rushed if you prepare your questions before your appointment.

- Your doctor wants your questions.
- Doctors know a lot about a lot of things, but they don't always know everything about you or what is best for you.
- Your questions give your doctor and health care team important information about you, such as your most important health care concerns.
- That is why they need you to speak up.

Health Facilities

Health facilities are places that provide health care. They include hospitals, clinics, outpatient care centers and specialized care centers, such as birthing centers and psychiatric care centers. When you choose a health facility, you might want to consider

- How close it is
- Whether your health insurance will pay for services there
- Whether your health care provider can treat you there
- The quality of the facility

Quality is important. Some facilities do a better job than others. One way to learn about the quality of a facility is to look at report cards developed by state and consumer groups.

Look for a hospital that:

- Is accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).
- Is rated highly by the State and by consumer groups or other organizations.
- Has a lot of experience and success in treating your condition.
- Monitors quality of care and works to improve quality.

In choosing a nursing home or other long-term care facility, look for one that:

- Has been found by State agencies and other groups to provide quality care.
- Provides a level of care, including staff and services, that will meet your needs.

Choosing the right medications: Brand Name vs. Generic

You may need to take medicines every day, or only once in a while. Either way, you want to make sure that the medicines are safe and will help you get better. In the United States, the Food and Drug Administration is in charge of assuring the safety and effectiveness of both prescription and over-the-counter medicines.

Even safe drugs can cause unwanted side effects or interactions with food or other medicines you may be taking. They may not be safe during pregnancy. To reduce the risk of reactions and make sure that you get better, it is important for you to take your medicines correctly.

Understanding Generic Drugs

Generic drugs are important options that allow greater access to health care for all Americans. They are copies of brand-name drugs and are the same as those brand name drugs in dosage form, safety, strength, route of administration, quality, performance characteristics and intended use.

Health care professionals and consumers can be assured that FDA approved generic drug products have met the same rigid standards as the innovator drug. All generic drugs approved by FDA have the same high quality, strength, purity and stability as brand-name drugs. And, the generic manufacturing, packaging, and testing sites must pass the same quality standards as those of brand name drugs.

Generic Drugs: Questions and Answers

What are generic drugs?

A generic drug is identical -- or bioequivalent -- to a brand name drug in dosage form, safety, strength, route of administration, quality, performance characteristics and intended use. Although generic drugs are chemically identical to their branded counterparts, they are typically sold at substantial discounts from the branded price. According to the Congressional Budget Office, generic drugs save consumers an estimated $8 to $10 billion a year at retail pharmacies. Even more billions are saved when hospitals use generics.

Are generic drugs as effective as brand-name drugs?

Yes. A generic drug is the same as a brand-name drug in dosage, safety, strength, quality, the way it works, the way it is taken and the way it should be used.

FDA requires generic drugs have the same high quality, strength, purity and stability as brand-name drugs.

Not every brand-name drug has a generic drug. When new drugs are first made they have drug patents. Most drug patents are protected for 20 years. The patent, which protects the company that made the drug first, doesn't allow anyone else to make and sell the drug. When the patent expires, other drug companies can start selling a generic version of the drug. But, first, they must test the drug and the FDA must approve it.

Creating a drug costs lots of money. Since generic drug makers do not develop a drug from scratch, the costs to bring the drug to market are less; therefore, generic drugs are usually less expensive than brand-name drugs. But, generic drug makers must show that their product performs in the same way as the brand-name drug.

How are generic drugs approved?

Drug companies must submit an abbreviated new drug application (ANDA) for approval to market a generic product. The Drug Price Competition and Patent Term Restoration Act of 1984, more commonly known as the Hatch-Waxman Act, made ANDAs possible by creating a compromise in the drug industry. Generic drug companies gained greater access to the market for prescription drugs, and innovator companies gained restoration of patent life of their products lost during FDA's approval process.

New drugs, like other new products, are developed under patent protection. The patent protects the investment in the drug's development by giving the company the sole right to sell the drug while the patent is in effect. When patents or other periods of exclusivity expire, manufacturers can apply to the FDA to sell generic versions.

The ANDA process does not require the drug sponsor to repeat costly animal and clinical research on ingredients or dosage forms already approved for safety and effectiveness. This applies to drugs first marketed after 1962.

What standards do generic drugs have to meet?

Health professionals and consumers can be assured that FDA approved generic drugs have met the same rigid standards as the innovator drug. To gain FDA approval, a generic drug must:

- contain the same active ingredients as the innovator drug (inactive ingredients may vary)
- be identical in strength, dosage form, and route of administration
- have the same use indications
- be bioequivalent
- meet the same batch requirements for identity, strength, purity, and quality
- be manufactured under the same strict standards of FDA's good manufacturing practice regulations required for innovator products

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1.14.6: Health Disparity

Despite prevention efforts, some groups of people are affected by HIV/AIDS, viral hepatitis, STI's, and TB, more than other groups of people. The occurrence of these diseases at greater levels among certain population groups more than among others is often referred to as a health disparity. Differences may occur by gender, race or ethnicity, education, income, disability, geographic location and sexual orientation among others. Social determinants of health like poverty, unequal access to health care, lack of education, stigma, and racism are linked to health disparities.

Health in the United States is a complex and often contradictory issue. One the one hand, as one of the wealthiest nations, the United States fares well in health comparisons with the rest of the world. However, the United States also lags behind almost every industrialized country in terms of providing care to all its citizens. The following sections look at different aspects of health in America.

Health by Race and Ethnicity

When looking at the social epidemiology of the United States, it is hard to miss the disparities among races. The discrepancy between African Americans and white Americans shows the gap clearly; in 2008, the average life expectancy for white males was approximately five years longer than for African American males: 75.9 compared to 70.9. An even stronger disparity was found in 2007: the infant mortality rate for African Americans was nearly twice that of white Americans at 13.2 compared to 5.6 per 1,000 live births (U.S. Census Bureau 2011). According to a report from the Henry J. Kaiser Foundation (2007), African Americans also have higher incidence of several other diseases and causes of mortality, from cancer to heart disease to diabetes. In a similar vein, it is important to note that ethnic minorities, including Mexican Americans and Native Americans, also have higher rates of these diseases and causes of mortality than whites. Lisa Berkman (2009) notes that this gap started to narrow during the Civil Rights movement in the 1960s, but it began widening again in the early 1980s.

What accounts for these perpetual disparities in health among different ethnic groups?

Much of the answer lies in the level of health care that these groups receive. The National Healthcare Disparities Report (2010) shows that even after adjusting for insurance differences, racial and ethnic minority groups receive poorer quality of care and less access to care than dominant groups. The Report identified these racial inequalities in care: Black Americans, American Indians, and Alaskan Natives received inferior care than Caucasian Americans for about 40 percent of measures Asian ethnicities received inferior care for about 20 percent of measures Among whites, Hispanic whites received 60 percent inferior care of measures compared to non-Hispanic whites (Agency for Health Research and Quality 2010). When considering access to care, the figures were comparable.

Health by Socioeconomic Status

Discussions of health by race and ethnicity often overlap with discussions of health by socioeconomic status, since the two concepts are intertwined in the United States. As the Agency for Health Research and Quality (2010) notes, "racial and ethnic minorities are more likely than non-Hispanic whites to be poor or near poor," so many of the data pertaining to subordinate groups is also likely to be pertinent to low socioeconomic groups. Marilyn Winkleby and her research associates (1992) state that "one of the strongest and most consistent predictors of a person's morbidity and mortality experience is that person's socioeconomic status (SES). This finding persists across all diseases with few exceptions, continues throughout the entire lifespan, and extends across numerous risk factors for disease."It is important to remember that economics are only part of the SES picture; research suggests that education also plays an important role. Phelan and Link (2003) note that many behavior-influenced diseases like lung cancer (from smoking), coronary artery disease (from poor eating and exercise habits), and AIDS initially were widespread across SES groups. However, once information linking habits to disease was disseminated, these diseases decreased in high SES groups and increased in low SES groups. This illustrates the important role of education initiatives regarding a given disease, as well as possible inequalities in how those initiatives effectively reach different SES groups.

Health by Gender

Women are affected adversely both by unequal access to and institutionalized sexism in the health care industry. According a recent report from the Kaiser Family Foundation, women experienced a decline in their ability to see needed specialists between 2001 and 2008. In 2008, one quarter of females questioned the quality of her health care (Ranji and Salganico 2011). In this report, we also see the explanatory value of intersection theory. Feminist sociologist Patricia Hill Collins developed this theory, which suggests we cannot separate the effects of race, class, gender, sexual orientation, and other attributes. Further examination of the lack of

confidence in the health care system by women, as identified in the Kaiser study, found, for example, women categorized as low income were more likely (32 percent compared to 23 percent) to express concerns about health care quality, illustrating the multiple layers of disadvantage caused by race and sex.

We can see an example of institutionalized sexism in the way that women are more likely than men to be diagnosed with certain kinds of mental disorders. Psychologist Dana Becker notes that 75 percent of all diagnoses of Borderline Personality Disorder (BPD) are for women according to the Diagnostic Statistical Manual of Mental Disorders. This diagnosis is characterized by instability of identity, of mood, and of behavior, and Becker argues that it has been used as a catch-all diagnosis for too many women. She further decries the pejorative connotation of the diagnosis, saying that it predisposes many people, both within and outside of the profession of psychotherapy, against women who have been so diagnosed (Becker).

Many critics also point to the medicalization of women's issues as an example of institutionalized sexism. Medicalization refers to the process by which previously normal aspects of life are redefined as deviant and needing medical attention to remedy. Historically and contemporaneously, many aspects of women's lives have been medicalized, including menstruation, pre-menstrual syndrome, pregnancy, childbirth, and menopause.

The medicalization of pregnancy and childbirth has been particularly contentious in recent decades, with many women opting against the medical process and choosing a more natural childbirth. Fox and Worts (1999) find that all women experience pain and anxiety during the birth process, but that social support relieves both as effectively as medical support. In other words, medical interventions are no more effective than social ones at helping with the difficulties of pain and childbirth. Fox and Worts further found that women with supportive partners ended up with less medical intervention and fewer cases of postpartum depression. Of course, access to quality birth care outside of the standard medical models may not be readily available to women of all social classes.

Summary

Despite generally good health in the U.S. compared with less-developed countries, America is still facing challenging issues such as a prevalence of obesity and diabetes. Moreover, Americans of historically disadvantaged racial groups, ethnicities, socioeconomic status, and gender experience lower levels of health care. Mental health and disability are health issues that are significantly impacted by social norms.

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1.14.7: Aging

More than 10,000 people turn 65 every day in the United States, and people are living longer, healthier lives. Healthy lifestyles, planning for retirement, and knowing your options for health care and long-term care are more important than ever before.

Across the world, the number and proportion of people aged 60 years and older in the population is increasing. In 2019, the number of people aged 60 years and older was 1 billion. This number will increase to 1.4 billion by 2030 and 2.1 billion by 2050. This increase is occurring at an unprecedented pace and will accelerate in coming decades, particularly in developing countries. This historically significant change in the global population requires adaptations to the way societies are structured across all sectors. For example, health and social care, transportation, housing and urban planning. Working to make the world more age-friendly is an essential and urgent part of our changing demographics.

- Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%.
- By 2020, the number of people aged 60 years and older will outnumber children younger than 5 years.
- In 2050, 80% of older people will be living in low- and middle-income countries.
- The pace of population ageing is much faster than in the past.
- All countries face major challenges to ensure that their health and social systems are ready to make the most of this demographic shift.

Adopting healthy habits and behaviors, staying involved in your community, using preventive services, managing health conditions, and understanding all your medications can contribute to a productive and meaningful life.

Cognitive Health

Cognitive health — the ability to clearly think, learn, and remember — is an important component of performing everyday activities. Cognitive health is just one aspect of overall brain health. Brain health refers to how well a person's brain functions across several areas.

Aspects of brain health include:

- Cognitive health: how well you think, learn, and remember
- Motor function: how well you make and control movements, including balance
- Emotional function: how well you interpret and respond to emotions (both pleasant and unpleasant)
- Tactile function: how well you feel and respond to sensations of touch — including pressure, pain, and temperature

Alzheimer's Disease & Related Dementias

Alzheimer's disease is the most common cause of dementia in older adults. It is a progressive brain disorder that slowly destroys memory and thinking skills. It is not a normal part of aging. Memory problems are typically one of the first signs of Alzheimer's disease. Scientists believe that a combination of genetic, lifestyle, and environmental factors influence when Alzheimer's disease begins and how it progresses. Current treatment approaches focus on helping people maintain mental function, manage behavioral symptoms, and slow or delay the symptoms of disease.

Eyes and Vision

As you age, it is normal to notice changes in your vision.

A few common changes for older adults include:

- Losing the ability to see up close
- Having trouble distinguishing colors, such as blue from black
- Needing more time to adjust to changing levels of light

The following eye problems can lead to vision loss and blindness in older adults. They may have few or no early symptoms. Regular eye exams are your best protection.

- **Age-related macular degeneration (AMD)** can harm the sharp, central vision needed to see objects clearly and to do common things like driving and reading. Your eye care professional will ask about your family history and look for signs of AMD during a dilated eye exam. Treatments are available, and special dietary supplements can help lower your chance of it getting worse.
- **Diabetic retinopathy** may occur if you have diabetes. It develops slowly, often with no early warning signs. If you have diabetes, be sure to have a dilated eye exam at least once a year. Keeping your blood sugar, blood pressure, and cholesterol

under control can prevent diabetic retinopathy or slow its progress in early stages. Laser surgery in later stages can sometimes prevent it from getting worse.

- **Cataracts** are cloudy areas in the eye's lens causing blurred or hazy vision. Some cataracts stay small and don't change your eyesight much. Others become large and reduce vision. Cataract surgery can restore good vision and is a safe and common treatment. If you have a cataract, your eye care professional will watch for changes over time to see if you would benefit from surgery.
- **Glaucoma** is usually caused by too much fluid pressure inside the eye. If not treated, it can lead to vision loss and blindness. People with glaucoma often have no early symptoms or pain. You can help protect yourself by having dilated eye exams yearly. Glaucoma can be treated with prescription eye drops, lasers, or surgery.
- **Dry eye** occurs when tear glands don't work well. You may feel stinging or burning, a sandy feeling as if something is in the eye, or other discomfort. Dry eye is common as people get older, especially for women. Your eye care professional may tell you to use a home humidifier or air purifier, special eye drops (artificial tears), or ointments to treat dry eye. For more severe cases, treatment options might include prescription medication, tear duct plugs, or surgery.

Hearing

Hearing loss is a common problem caused by noise, aging, disease, and heredity. People with hearing loss may find it hard to have conversations with friends and family. They may also have trouble understanding a doctor's advice, responding to warnings, and hearing doorbells and alarms. Approximately one in three people between the ages of 65 and 74 has hearing loss, and nearly half of those older than 75 has difficulty hearing. But, some people may not want to admit they have trouble hearing.

Some people have a hearing problem and don't realize it.

You should see your doctor if you:

- Have trouble hearing over the telephone
- Find it hard to follow conversations when two or more people are talking
- Often ask people to repeat what they are saying
- Need to turn up the TV volume so loud that others complain
- Have a problem hearing because of background noise
- Think that others seem to mumble
- Can't understand when women and children speak to you

Common types of hearing loss include:

- **Sudden sensorineural hearing loss**, or sudden deafness, is a rapid loss of hearing. It can happen to a person all at once or over a period of up to 3 days. It should be considered a medical emergency. If you or someone you know experiences sudden sensorineural hearing loss, visit a doctor immediately.
- Age-related hearing loss comes on gradually as a person gets older and usually occurs in both ears. It seems to run in families and may occur because of changes in the inner ear and auditory nerve. The loss is gradual, so someone with presbycusis (age-related hearing loss) may not realize that he or she has lost some of his or her ability to hear.
- Tinnitus is also common in older people. It is typically described as ringing in the ears, but it also can sound like roaring, clicking, hissing, or buzzing. It can come and go. It might be heard in one or both ears, and it may be loud or soft. Tinnitus is sometimes the first sign of hearing loss in older adults.

Healthy Aging

Many factors influence healthy aging. Some of these, such as genetics, are not in our control. Others — like exercise, a healthy diet, going to the doctor regularly, and taking care of our mental health — are within our reach. Research supported by National Institute on Aging (NIA) and others has identified actions you can take to help manage your health, live as independently as possible, and maintain your quality of life as you age, these include both physical and mental health strategies.

Take care of your physical health:

- Get moving: Exercise and physical activity
  - Physical activity is a cornerstone of healthy aging.
  - As people age, muscle function often declines. Older adults may not have the energy to do everyday activities and can lose their independence. However, exercise can help older adults maintain muscle mass as they age.

- A study of adults 40 and older found that taking 8,000 steps or more per day, compared to only taking 4,000 steps, was associated with a 51% lower risk of death from all causes[7].

- Healthy eating: Make smart food choices
  - Making smart food choices can help protect you from certain health problems as you age and may even help improve brain function.
  - A 2021 study analyzing the eating patterns of more than 21,000 participants found that people closely following the Mediterranean-style pattern had a significantly lower risk of sudden cardiac death[8].
  - A low-salt diet called Dietary Approaches to Stop Hypertension (DASH) has also been shown to deliver significant health benefits
- Getting a good night's sleep
  - Getting enough sleep helps you stay healthy and alert. Even though older adults need the same seven to nine hours of sleep as all adults, they often don't get enough.
  - A study, which looked at data from nearly 8,000 people, showed that those in their 50s and 60s who got six hours of sleep or less a night were at a higher risk of developing dementia later in life[9].
- Quit smoking
  - It doesn't matter how old you are or how long you've been smoking, research confirms that even if you're 60 or older and have been smoking for decades, quitting will improve your health. Quitting smoking at any age will:
    - Lower your risk of cancer, heart attack, stroke, and lung disease
    - Improve your blood circulation
    - Improve your sense of taste and smell
    - Increase your ability to exercise
    - Set a healthy example for others
- Alcohol and other substances
  - Like all adults, older adults should avoid or limit alcohol consumption. In fact, aging can lead to social and physical changes that make older adults more susceptible to alcohol misuse and abuse and more vulnerable to the consequences of alcohol.
- Go to the doctor regularly
  - Going to the doctor for regular health screenings is essential for healthy aging.
  - A 2021 study found that getting regular check-ups helps doctors catch chronic diseases early and can help patients reduce risk factors for disease, such as high blood pressure and cholesterol levels. People who went to the doctor regularly also reported improved quality of life and feelings of wellness[10].

Take care of your mental health:

- Social isolation and loneliness
  - As people age, changes such as hearing and vision loss, memory loss, disability, trouble getting around, and the loss of family and friends can make it difficult to maintain social connections. This makes older adults more likely to be socially isolated or to feel lonely.
  - A 2021 study of more than 11,000 adults older than age 70 found that loneliness was associated with a greater risk of heart disease[11].
- Stress
  - Research shows that constant stress can change the brain, affect memory, and increase the risk of developing Alzheimer's or related dementias.
  - A meta-analysis funded by the National Institute of Mental Health supports the notion that stress and anxiety rewire the brain in ways that can impact memory, decision-making, and mood[12].
- Depression and overall mood
  - Although depression is common in older adults, it can be difficult to recognize. For some older adults with depression, sadness is not their main symptom. Instead, they might feel numb or uninterested in activities and may not be as willing to talk about their feelings.
  - A 2020 longitudinal study demonstrated a link between positive mood and better cognitive control[13].
- Leisure activities and hobbies

- Your favorite activities are not only fun — they may also be good for your health. Research shows that people who participate in hobbies and social and leisure activities may be at lower risk for some health problems.
- A study showed that older adults who spent at least an hour reading or engaged in other hobbies had a decreased risk of dementia compared to those who spent less than 30 minutes a day on hobbies[14].

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1.14.8: Dealing with Death

It is a fact that we will one day die, how will you prepare for that day?

Advance Care Planning

Advance care planning involves learning about the types of decisions that might need to be made, considering those decisions ahead of time, and then letting others know—both your family and your health care providers—about your preferences. These preferences are often put into an *advance directive*, a legal document that goes into effect only if you are incapacitated and unable to speak for yourself. An advance directive also allows you to express your values and desires related to end-of-life care. There are two main elements in an advance directive—a living will and a durable power of attorney for health care. A living will is a written document that helps you tell doctors how you want to be treated if you are dying or permanently unconscious and cannot make your own decisions about emergency treatment. A durable power of attorney for health care is a legal document naming a health care proxy, someone to make medical decisions for you at times when you are unable to do so.

Organ and Brain Donation

Data shows that 90% of adults support organ donation but only 60% are actually signed up as donors.

Organ donation is the act of taking healthy organs and tissues from one person and giving them to someone else. Making the decision to donate your organs is one of the most generous gifts you can give. There is no age limit for donation or to sign up. In 2021, one out of every three people who donated organs was over the age of 50. You're never too old to make a difference — as of 2021, the oldest organ donor in the United States was 92.

While many people think that signing up to be an organ donor includes donating their brain, the purpose and the process of brain donation are different. Rather than helping to keep others alive, such as with kidney donation, brain donation helps advance scientific research. One donated brain can make a huge impact, potentially providing information for hundreds of studies.

Why donate:

- 106,008 men, women, and children are on the national transplant waiting list.
- Every 9 minutes another person is added to the transplant waiting list.
- 17 people die each day waiting for an organ transplant.
- Every donor can save 8 lives and enhance over 75 more.

✔ Become and offiicial organ donor

Are you ready to save lives? You can provide lifesaving organs to as many as eight people. ***Every registration counts.***

Sign Up To Be An Organ Donor

Retirement and Savings

Retirement requires a lot of planning and consideration. In addition to finances, you need to think about when and where you'll retire. Experts advise that you may need as much as 80 percent of your pre-retirement income to continue your current standard of living. The exact amount will depend on your individual needs.

As you plan, consider these important questions:

- At what age do you plan to retire?
- Can you participate in an employer's retirement savings plan? This includes 401(k) plans and traditional pension plans.
- If you have a spouse or partner, will they retire when you do?
- Where do you plan to live when you retire? Will you downsize, rent, or own your home?
- Do you expect to work part-time?
- Will you have the same medical insurance you had while working? Will your insurance coverage change?
- Do you want to travel or pursue a costly, new hobby?
- Will you qualify for social security?

Social Security provides you with a source of income when you retire or if you can't work due to a disability. It can also support your legal dependents (spouse, children, or parents) with benefits in the event of your death.

While you work, you pay Social Security taxes. This tax money goes into a trust fund that pays benefits to:

- Those who are currently retired
- To people with disabilities
- To the surviving spouses and children of workers who have died

Each year you work, you'll get credits to help you become eligible for benefits when it's time for you to retire.

Saving for retirement

Get tips for building your retirement savings in the Department of Labor's (DOL) Top 10 Ways to Prepare for Retirement

Use a retirement calculator to find out the best age to claim your Social Security benefits.

Make a plan with the Retirement Saving worksheet

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1.14.9: End-of-Chapter Material

Key takeaways for this Chapter

- We are living much longer.
- You can easily be tricked by health fraud, so it is important to be a critical consumer of health information.
- The U.S. does not have universal healthcare, so it is important that you ensure you have healthcare either through employment, by purchasing your own insurance, or through government programs.
- Both western and eastern medicine can be helpful depending on your health status and goals.
- As you age, be aware of changes to your mind and body.
- Aging is highly dependent on your lifestyle choices.
- It is important to start planning for end of life to ensure your wishes are known.
- Plan for retirement early in your employment career to ensure you are taking the necessary steps to meet your retirement goals.

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1.14.10: Health Care and Aging- Optional Continued Learning

The videos below provide an opportunity to expand on your learning from the chapter. As you watch the video, make a list of what you notice and what you wonder. This is a great strategy to listen purposefully, engage with the content, and look for deeper opportunities for self growth, self-reflection, and learning.

What do you **notice**?

- How does this topic support, expand, or challenge the content in the chapter?
- How does this topic connect to health topics from other chapters?
- How does this topic connect with your prior learning, your experiences, your work, your family, or your life in general?
- How does this topic help you to more fully understand health and wellness?

What do you **wonder**?

- How has this topic sparked your curiosity?
- What would you like to know more about?
- What questions did you have as you reviewed the topic?
- What other popular and scholarly sources support or refute this topic?

Videos for continued learning and application

Note: These videos are intended to more fully reflect on health. You might agree or disagree with the videos and that is ok! Utilize these videos to critically think through the topics and identify other sources, both scholarly and popular, to convey your learning.

Essential questions to ask your future self



How healthy living nearly killed me



How humanity doubled life expectancy in a century



How the COVID-19 vaccines were created so quickly



How to find meaning after loss



How to live to be 100+

https://med.libretexts.org/@go/page/88067



How to support yourself (and others) through grief



It’s our city. Let’s fix it



The emotions behind your money habits



The profound power of gratitude and “living eulogies”



The science of preserving sight



What Americans agree on when it comes to health



What I learned from 2,000 obituaries



What if our health care system kept us healthy?



What really happens to your body during menopause



What to trust in a “post-truth” world



Why do our bodies age?



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SECTION OVERVIEW

1.15: Bonus- Environmental Wellness - A Healthy Planet

Learning Outcomes

By the end of this chapter you will be able to:

- Explain the relationship of CO2 to climate change.
- Provide evidence of climate change.
- Explain the impact of climate change on public health.
- List strategies for increasing health of the planet.

How are you impacting the environment?

How is the environment impacting you?

Mahatma Gandhi is quoted as saying, “Earth provides enough to satisfy every man’s needs, but not every man’s greed.” What was Gandhi trying to convey with that statement? Maybe, that the Earth does not have limitless resources for human consumption and that we as humans impact the health of the planet by the choices we make. All humans live on one planet, planet Earth. Some call Earth “Mother Earth” because Earth nurtures life just like a mother. Human societies throughout history have symbols and depictions of Earth as a nurturer since every species on Earth depends on the resources of the planet for existence. The relationship between humans and the environment is studied through a branch of public health known as **Environmental Health**. Environmental health seeks to understand how the environment impacts human health and how humans impact the health of the planet.

1.15.1: Climate Literacy

1.15.2: Climate Change and Global Warming

1.15.3: Healthier Home, Community, Country, and World

1.15.4: End-of-Chapter Material

The information in this chapter primarily comes from:

- Globalchange.gov: *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*
- The United States Global Change Research Program:*Climate Literacy: The Essential Principles of Climate Science*
- Nasa: *Global Climate Change*
- The U.S. Environmental Protection Agency: *Climate Change*
- World Health Organization: *Climate Change*
- *National Institute for Environmental Health Sciences*

Note: This is bonus material, for the curious. It is not part of our course.

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1.15.1: Climate Literacy

Climate Science Literacy is an understanding of your influence on climate and climate's influence on you and society. It is important for each human living on earth to understand climate. Society needs citizens who understand the climate system and know how to apply that knowledge in their careers and in their engagement as active members of their communities.

A climate-literate person:

- Understands the essential principles of Earth's climate system.
  - Essential Principle 1: The Sun is the Primary Source of Energy for Earth's Climate System
  - Essential Principle 2: Climate is regulated by complex interactions among components of the Earth system.
  - Essential Principle 3: Life on Earth depends on, is shaped by, and affects climate.
  - Essential Principle 4: Climate varies over space and time through both natural and man-made processes.
  - Essential Principle 5: Our understanding of the climate system is improved through observations, theoretical studies, and modeling.
  - Essential Principle 6: Human activities are impacting the climate system.
  - Essential Principle 7: Climate change will have consequences for the Earth system and human lives
- Knows how to assess scientifically credible information about climate.
- Communicates about climate and climate change in a meaningful way.
- Is able to make informed and responsible decisions with regard to actions that may affect climate.

This chapter is intended to help build your climate literacy.

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1.15.2: Climate Change and Global Warming

"Climate change" and "global warming" are often used interchangeably but have distinct meanings. Global warming is the long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere. Climate change is long-term changes in the average weather patterns that have come to define Earth's local, regional and global climates.

Global Warming: The Greenhouse Effect

Imagine stepping into a greenhouse. The temperature inside and outside of a greenhouse can be very different. Outside of a greenhouse you can feel the heat from the sun's rays, but the heat can escape to the atmosphere, however, inside the greenhouse, the sun's rays are turned to heat and the heat is trapped by the greenhouse. The way a greenhouse traps heat making it warmer inside than outside, is similar to how the greenhouse gases in the Earths atmosphere, such as CO2, trap heat and increase the temperature of the planet.

Earth is surrounded by the earth's atmosphere, which is an envelope of gases surrounding the earth. The sun provides solar radiation to our planet that passes through the earths atmosphere. When the Sun's solar rays hit our planet the solar radiation turns to heat. Gases in the atmosphere, such as carbon dioxide, nitrous oxide, methane, and water vapor, block heat from escaping, thus trapping in heat inside our atmosphere.

The trapping of heat is called the Greenhouse effect. Global warming refers to the recent and ongoing global average increase in temperature near the Earth's surface. Scientists attribute the global warming trend observed since the mid-20th century to the "greenhouse effect."

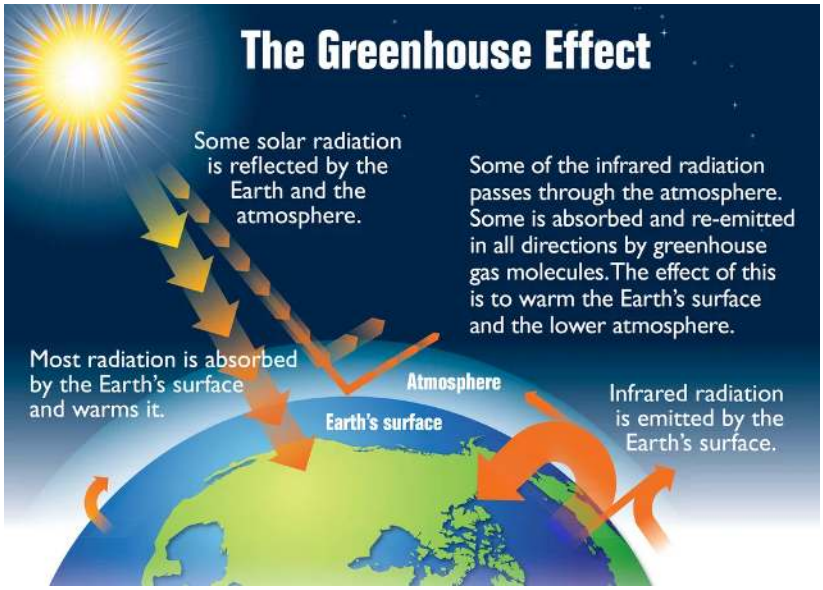


Figure 1.15.2.1**: The Greenhouse effect**

Evidence/Indicators of Climate Change

A picture is worth 1,000 words

Nasa has provided a library of "Images of Change" that show show a before and after comparison of land masses, glaciers, oceans, etc to depict how climate change is impacting the world around you. Some of the pictures show more recent changes, for example how the drought has changed Lake Powell, others show changes over time, such as the Muir Glacier Melt in Alaska.



Figure 1.15.2.2: Muir Glacier Melt, Alaska. 1941 compared to 2004

The Earth's climate is changing. Observations from around the world show the **widespread effects** of increasing greenhouse gas concentrations on Earth's climate. For example:

- High temperature extremes, droughts, and heavy precipitation events are becoming more frequent and intense.
- Glaciers and snow cover are shrinking, and sea ice is retreating.
- Seas are warming, rising, and becoming more acidic, and marine species are moving to new locations in colder waters.
- Flooding is becoming more frequent along the U.S. coastline.
- Growing seasons are lengthening, and areas burned by wildfire are growing.

The Environmental Protection Agency has compiled a key set of indicators[1] related to the causes and effects of climate change. The climate change indicators provide important information on how and why the climate is changing. These indicators include: greenhouse gases, weather and climate, oceans, snow and ice, health and society, and ecosystem

Greenhouse gases

Ice cores[2] are like frozen time capsules that allow scientists to reconstruct climate far into the past. Using ice cores, scientists have been able to measure greenhouse gas emissions from over 800,000 years ago. Ice cores provide a direct measurement of greenhouse gases thus are considered a gold standard. As greenhouse gas emissions from human activities increase, they build up in the atmosphere and warm the climate, leading to many other worldwide changes in the atmosphere, on land, and in the oceans. Greenhouse gases from human activities are the most significant driver of observed climate change since the mid-20th century.

Summary of key points:

- In the United States, greenhouse gas emissions caused by human activities increased by 2 percent from 1990 to 2019. Since 2005, however, total U.S. greenhouse gas emissions have decreased by 12 percent. Carbon dioxide accounts for most of the nation's emissions and most of the increase since 1990. Transportation is the largest source of greenhouse gas emissions in the United States, followed by electricity generation. Emissions per person have decreased slightly in the last few years.
- Worldwide, net emissions of greenhouse gases from human activities increased by 43 percent from 1990 to 2015. Emissions of carbon dioxide, which account for about three-fourths of total emissions, increased by 51 percent over this period. As with the United States, the majority of the world's emissions result from transportation, electricity generation, and other forms of energy production and use.
- Concentrations of carbon dioxide and other greenhouse gases in the atmosphere have increased since the beginning of the industrial era. Almost all of this increase is attributable to human activities. Historical measurements show that the current global atmospheric concentrations of carbon dioxide are unprecedented compared with the past 800,000 years, even after accounting for natural fluctuations.
- From 1990 to 2019, the total warming effect from greenhouse gases added by humans to the Earth's atmosphere increased by 45 percent. The warming effect associated with carbon dioxide alone increased by 36 percent.

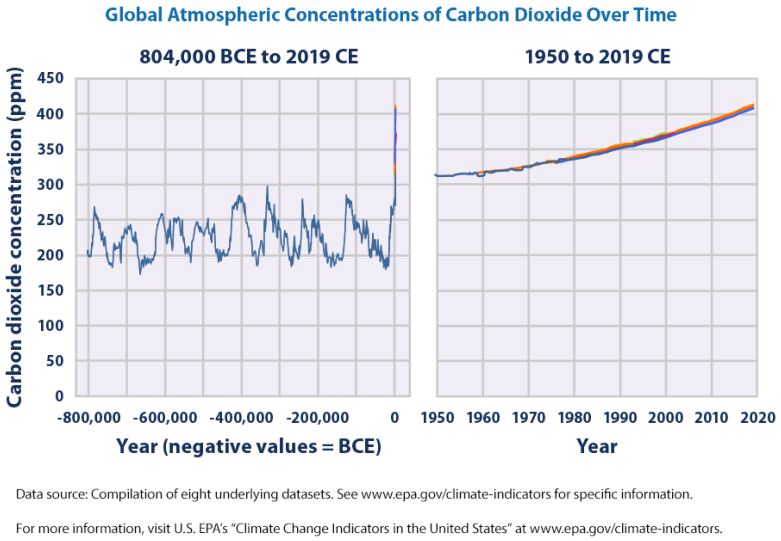


Figure 1.15.2.3: Global Atmospheric Concentrations of Greenhouse Gases

Weather and climate

Rising global average temperature is associated with widespread changes in weather patterns. Weather is what conditions of the atmosphere are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time.

Summary of Key Points

- Average temperatures have risen across the contiguous 48 states since 1901, with an increased rate of warming over the past 30 years.
- Eight of the top 10 warmest years on record have occurred since 1998. All of the top 10 warmest years on record worldwide have occurred since 2005.
- Since 1896, average winter temperatures across the contiguous 48 states have increased by nearly 3°F. Spring temperatures have increased by about 2°F, while summer and fall temperatures have increased by 1.4°F.
- Record-setting daily high temperatures have become more common than record lows. Since the 1970s, unusually hot summer days (highs) and unusually hot summer nights (lows) have become more common over the last few decades. Unusually cold winter temperatures have become less common—particularly very cold nights (lows).
- Heat waves are occurring three times more often than they did in the 1960s—about six per year compared with two per year. The average heat wave season is 47 days longer, and individual heat waves are lasting longer and becoming more intense.
- Since 1901, precipitation has increased at an average rate of 0.1 inches per decade over land areas worldwide. However, shifting weather patterns have caused certain areas, such as the Southwest, to experience less precipitation than usual.
- The prevalence of extreme single-day precipitation events remained fairly steady between 1910 and the 1980s but has risen substantially since then. Nationwide, nine of the top 10 years for extreme one-day precipitation events have occurred since 1996.
- Floods have generally become larger across parts of the Northeast and Midwest and smaller in the West, southern Appalachia, and northern Michigan. Large floods have become more frequent across the Northeast, Pacific Northwest, and parts of the northern Great Plains, and less frequent in the Southwest and the Rockies.
- Drought trends vary by region, as the West has generally experienced more drought while the Midwest and Northeast have become wetter.
- The southwestern United States is particularly sensitive to changes in temperature and thus vulnerable to drought, as even a small decrease in water availability in this already arid region can stress natural systems and further threaten water supplies. Several measures indicate persistent and more severe drought conditions in recent years.

Oceans

Covering about 70 percent of the Earth's surface, the world's oceans have a two-way relationship with weather and climate. The oceans influence the weather on local to global scales, while changes in climate can fundamentally alter many properties of the oceans.

Summary of Key Points

- The amount of heat stored in the ocean has increased substantially since the 1950s. Ocean heat content not only determines sea surface temperature, but also affects sea level and currents.
- Sea surface temperatures have been consistently higher during the past three decades than at any other time since reliable observations began in the late 1800s.
- When averaged over all of the world's oceans, sea level has risen at a rate of roughly six-tenths of an inch per decade since 1880. Changes in sea level relative to the land vary by region. Along the U.S. coastline, sea level has risen the most along the Mid-Atlantic coast and parts of the Gulf coast, where several stations registered increases of more than 8 inches between 1960 and 2020. Sea level has decreased relative to the land in parts of Alaska and the Pacific Northwest.
- As sea level rises, dry land and wetlands can turn into open water. Along many parts of the Atlantic coast, this problem is made worse by low elevations and land that is already sinking. Between 1996 and 2011, the coastline from Florida to New York lost more land than it gained.
- Flooding is becoming more frequent along the U.S. coastline as sea level rises. Every site measured has experienced an increase in coastal flooding since the 1950s. The rate is accelerating at most locations along the East and Gulf coasts. The East Coast suffers the most frequent coastal flooding and has generally experienced the largest increases in the number of flood days.
- The ocean has become more acidic over the past few decades because of increased levels of atmospheric carbon dioxide, which dissolves in the water. Higher acidity affects the balance of minerals in the water, which can make it more difficult for certain marine animals to build their protective skeletons or shells.

Snow and Ice

The Earth's surface contains many forms of snow and ice, including sea, lake, and river ice; snow cover; glaciers, ice caps, and ice sheets; and frozen ground. Climate change can dramatically alter the Earth's snow- and ice-covered areas because snow and ice can easily change between solid and liquid states in response to relatively minor changes in temperature.

Summary of Key Points

- The part of the Arctic Ocean covered by ice is typically smallest in September, after the summer melting season. Arctic sea ice has decreased over time, and in September 2020 it was the second smallest ever recorded. The length of the melt season for Arctic ice has grown, and the ice has also become thinner, which makes it more vulnerable to further melting.
- Antarctic sea ice has increased slightly overall since 1979, though it has decreased in the last few years. Slight increases in Antarctic sea ice are outweighed by the loss of sea ice in the Arctic during the same time period.
- Since 1992, the giant ice sheets that cover Greenland and Antarctica have each lost more than 100 billion metric tons of ice per year on average. The total amount of ice lost from 1992 to 2018 was enough to raise sea level worldwide by an average of roughly seven-tenths of an inch.
- Glaciers in the United States and around the world have generally shrunk since the 1960s, and the rate at which glaciers are melting has accelerated over the last decade.
- Lakes in the northern United States are freezing later and thawing earlier compared with the 1800s and early 1900s.
- Since the early 1970s, all five of the Great Lakes have experienced a long-term decrease in the maximum area that freezes each year, but the decrease is only statistically meaningful in one lake (Superior). The number of frozen days per year has also decreased for all five lakes since the early 1970s.
- Total snowfall has decreased in most parts of the country since widespread records began in 1930. One reason for this decline is that nearly 80 percent of the locations studied have seen more winter precipitation fall in the form of rain instead of snow.
- Between 1972 and 2020, the average portion of North America covered by snow decreased at a rate of about 1,870 square miles per year, based on weekly measurements taken throughout the year. The length of time when snow covers the ground has become shorter by nearly two weeks since 1972, on average.

- The amount of snow on the ground (snowpack) in early spring decreased at 86 percent of measurement sites in the western United States between 1955 and 2020 and snowpack at all sites declined by an average of 19 percent during this time period.
- About 80 percent of Alaska's land is underlain by permafrost, which refers to rock or soil with ice that stays frozen for two or more years. Between 1978 and 2020, permafrost temperatures increased at 14 out of 15 long-term monitoring sites in Alaska.
- The number of days per year with unfrozen ground has increased at an average rate of about four days per decade in both the contiguous 48 states and Alaska. Unfrozen days have generally increased across North America, with some variability by region.

Health and Society

Changes in the Earth's climate can affect public health, agriculture, water supplies, energy production and use, land use and development, and recreation.

Summary of Key Points

- Since 1979, more than 11,000 Americans were reported to have died as a direct result of heat-related illnesses such as heat stroke, and even more died where heat was a contributing factor.
- From 2001 to 2010, a total of about 28,000 heat-related hospitalizations were recorded across 20 states.
- Since 1979, more than 19,000 Americans were reported to have died from exposure to cold temperatures, and even more died where exposure to cold was a contributing factor.
- As the U.S. climate has warmed in recent years Americans in the North and West are using less energy for heating and more energy for air conditioning, while much of the Southeast has experienced the opposite results.
- Since 1973, the average amount of electricity used by Americans at home during the summer has nearly doubled, but it appears to have leveled somewhat in recent years. Conversely, the average American's winter use of natural gas (the most common home heating fuel) has decreased since 1974.
- Nationwide, the rate of reported cases of Lyme disease has nearly doubled since 1991. The number and distribution of reported cases of Lyme disease have increased in the Northeast and upper Midwest over time, where some states now report 50 to 110 more cases of Lyme disease per 100,000 people than they did in 1991.
- The length of the growing season for crops and other plants has increased in almost every state. States in the Southwest (e.g., Arizona and California) have seen the most dramatic increase. In contrast, the growing season has become slightly shorter in two states (Alabama and Georgia). The observed changes reflect earlier spring warming as well as later arrival of fall frosts. The length of the growing season has increased more rapidly in the West than in the East.
- Since the late 1940s, the annual number of growing degree days increased at 75 percent of the locations measured across the contiguous 48 states. The average change was a 9 percent increase. The largest increases occurred in the West and the Northeast.
- The length of ragweed pollen season has increased at 10 out of 11 locations studied in the central United States and Canada since 1995 allowing ragweed plants to produce pollen later into the year, potentially prolonging the allergy season for millions of people.

Ecosystems

Ecosystems provide humans with food, clean water, and a variety of other services that can be affected by climate change.

Summary of Key Points

- Since 1983, the United States has had on average 70,000 recorded wildfires per year. The top 10 years with the largest acreage burned since 1983, have all occurred since 2004 with many of the largest increases occurring in western states.
- Over the past 79 years, minimum, maximum, and average streamflows have changed in many parts of the country—some higher, some lower. Among rivers and streams strongly influenced by snowmelt, peak flow from winter-spring runoff is happening at least five days earlier than it did in the mid-20th century.
- From 1960 through 2014, water temperature increased at 79 percent of the stream sites measured in the Chesapeake Bay region.

- Between 1960 and 2020, water temperatures increased by 1.9°F in the Snake River at a site on tribal lands in eastern Washington. Several species of salmon use the Snake River to migrate and spawn, and these salmon play an important role in the diet, culture, religion, and economy of the region's Native Americans.
- Since 1985, summer surface water temperatures have increased in 32 of the 34 lakes with long-term records that this indicator tracks across North America.
- Water levels in most of the Great Lakes appear to have declined slightly over the last few decades.
- Long-term studies have found that bird species in North America have shifted their wintering grounds northward by an average of more than 40 miles since 1966, with several species shifting by hundreds of miles. Some birds shift their range or alter their migration habits to adapt to changes in temperature or other environmental conditions.
- Shifts in location have occurred among several economically important fish and shellfish species that have moved about 20 miles, and 21 feet deeper in the water, between 1982 and 2018. For example, American lobster, black sea bass, and red hake in the Northeast have moved northward by an average of 113 miles.
- Leaf growth and flower blooms are examples of natural events whose timing can be influenced by climate change. In general, leaf and bloom events are happening earlier throughout the North and West but later in much of the South. for example, Cherry Blossom Bloom Dates in Washington, D.C. Peak bloom dates of the iconic cherry trees in Washington, D.C., recorded since the 1920s, indicate that cherry trees are blooming slightly earlier than in the past. Bloom dates are key to planning the Cherry Blossom Festival, one of the region's most popular spring attractions.

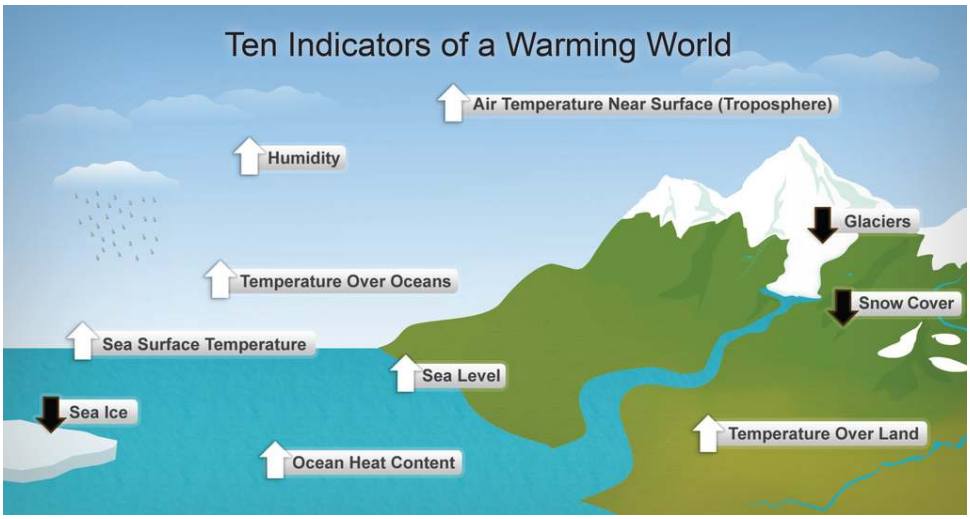


Figure 1.15.2.3: Ten Indicators of a Warming World

Exercises: Data, data, and more data

Are you curious how the U.S. compares to other countries in the various elements of climate change? Do you like looking at data and graphs? If so, check out "Our World in Data" to view extensive data and graphs on climate change for the U.S. and around the world.

Impacts of Climate Change on Human Health

Climate change is a significant threat to the health of the American people and every American is vulnerable to the health impacts associated with climate change. The U.S. Global Change Research Program's (USGCRP's) National Climate Assessment (NCA) process has published a scientific assessment on the impact of climate change on human health[3].

With climate change, the frequency, severity, duration, and location of weather and climate phenomena, like rising temperatures, heavy rains and droughts, and some other kinds of severe weather, are changing. This means that areas already experiencing health-threatening weather and climate phenomena are likely to experience worsening impacts, it also means that some locations will experience new climate-related health threats. Climate changes that impact human health include: wildfires, heat waves, drought, cold waves and winter storms, sea level changes, hurricanes, floods, extreme precipitation, and rising temperatures.

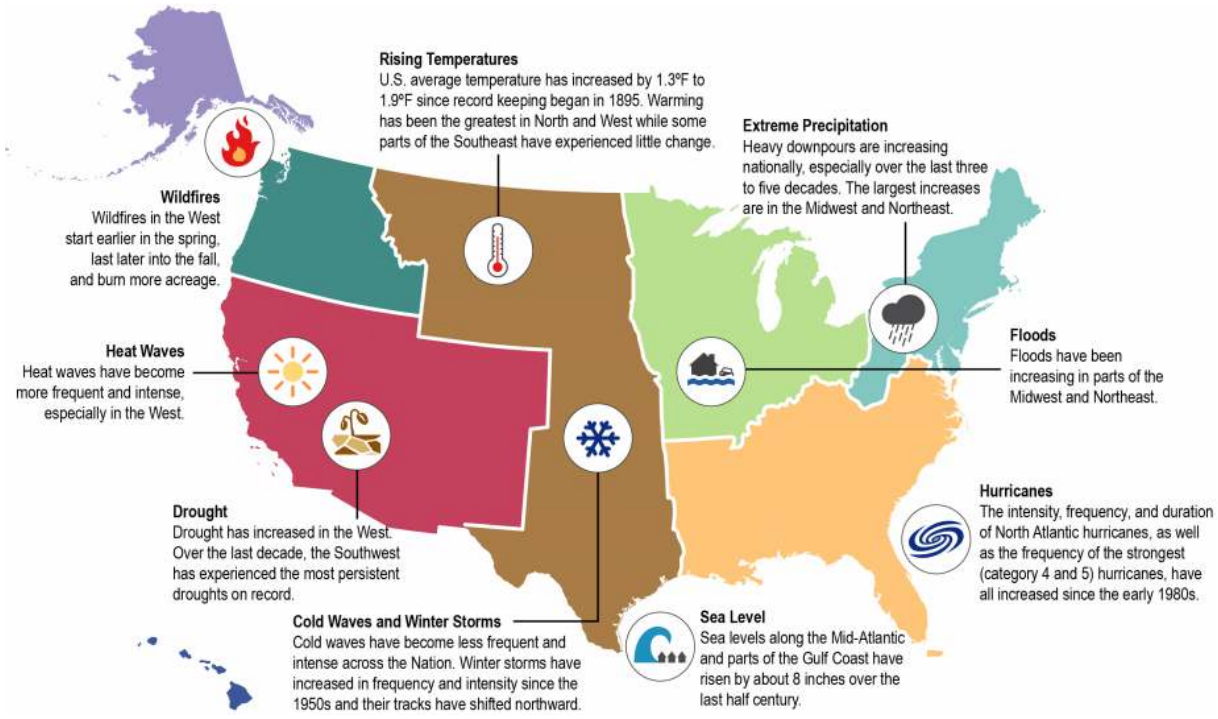


Figure 1.15.2.4: Major U.S. national and regional climate trends

Changes in the environment may have numerous impacts to existing health conditions and the development of new diseases.

Table 1.15.2.1: Health Risks Associated with Climate Change
Source: Adapted from Impacts of Global Climate Change on Health: Climate Change and Health

Health Conditions	Possible Influences of Climate Change
ALZHEIMER'S DISEASE	Persons with cognitive impairments are vulnerable to extreme weather events that require evacuation or other emergency responses.
ASTHMA	Asthma is exacerbated by changes in pollen season and allergenicity and in exposures to air pollutants affected by changes in temperature, humidity, and wind.
CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)	COPD patients are more sensitive than the general population to changes in ambient air quality associated with climate change.
DIABETES	Diabetes increases sensitivity to heat stress; medication and dietary needs may increase vulnerability during and after extreme weather events.
CARDIOVASCULAR DISEASE	Cardiovascular disease increases sensitivity to heat stress.
MENTAL ILLNESS	Mental illness may impair responses to extreme events ; certain medications increase sensitivity to heat stress.
OBESITY	Obesity increases sensitivity to high ambient temperatures.
DISABILITY	Persons with disabilities may find it hard to respond when evacuation is required and when there is no available means of transportation or easy exit from residences.

The following sections provide key findings from the "The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment." In the official report, each key finding is notated with a level of confidence, from medium to high levels of confidence based on scientific analyses.

Temperature-Related Death and Illness

Key findings:

- By the end of the century, an increase of thousands to tens of thousands of premature heat-related deaths in the summer and a decrease of premature cold-related deaths in the winter are projected each year as a result of climate change.
- Days that are hotter than usual in the summer or colder than usual in the winter are both associated with increased illness and death.
- Some populations are more vulnerable to death or illness due to high temperatures such as children, older adults, people working outdoors, the socially isolated and economically disadvantaged, those with chronic illnesses, as well as some communities of color.

Air Quality Impacts

Key Findings

- Changes in the climate affect the air we breathe, both indoors and outdoors.
- Climate-driven increases in ozone will cause premature deaths, hospital visits, lost school days, and acute respiratory symptoms
- Changes in climate, specifically rising temperatures, altered precipitation patterns, and increasing concentrations of atmospheric carbon dioxide, are expected to contribute to increases in the levels of some airborne allergens and associated increases in asthma episodes and other allergic illnesses .
- Climate change is projected to increase the number and severity of naturally occurring wildfires in parts of the United States, increasing emissions of particulate matter and ozone precursors and resulting in additional adverse health outcomes.

Extreme Events

Key Findings

- Extreme weather events can cause death or injury during an event (for example, drowning during floods), however health impacts can also occur before or after an extreme event, as individuals may be involved in activities that put their health at risk, such as disaster preparation and post-event cleanup.
- Climate change will increase exposure risk in some regions of the United States due to projected increases in the frequency and/or intensity of drought, wildfires, and flooding related to extreme precipitation and hurricanes.
- Many types of extreme events related to climate change cause disruption of infrastructure, including power, water, transportation, and communication systems, that are essential to maintaining access to health care and emergency response services and safeguarding human health.
- Climate change will increase exposure risk to coastal flooding due to increases in extreme precipitation and in hurricane intensity and rainfall rates, as well as sea level rise and the resulting increases in storm surge

Vector-Borne Diseases

Key Findings

- Vector-borne diseases are illnesses that are transmitted by vectors, which include mosquitoes, ticks, and fleas.
- Climate change is expected to alter the geographic and seasonal distributions of existing vectors and vector-borne diseases.
- Ticks capable of carrying the bacteria that cause Lyme disease and other pathogens will show earlier seasonal activity and a generally northward expansion in response to increasing temperatures associated with climate change. Longer seasonal activity and expanding geographic range of these ticks will increase the risk of human exposure to ticks.
- Alterations in the distribution, abundance, and infection rate of mosquitoes will influence human exposure to bites from infected mosquitoes, which is expected to alter risk for human disease.
- Vector-borne pathogens are expected to emerge or reemerge due to the interactions of climate factors with many other drivers, such as changing land-use patterns.

Water-Related Illness

Key Findings

- Increases in water temperatures associated with climate change will alter the seasonal windows of growth and the geographic range of suitable habitat for freshwater toxin-producing harmful algae, certain naturally occurring Vibrio bacteria, and marine toxin-producing harmful algae. These changes will increase the risk of exposure to waterborne pathogens and algal toxins that can cause a variety of illnesses.
- Runoff from more frequent and intense extreme precipitation events will increasingly compromise recreational waters, shellfish harvesting waters, and sources of drinking water through increased introduction of pathogens and prevalence of toxic algal blooms. As a result, the risk of human exposure to agents of water-related illness will increase.
- Increases in some extreme weather events and storm surges will increase the risk that infrastructure for drinking water, wastewater, and stormwater, will fail due to either damage or exceedance of system capacity, especially in areas with aging infrastructure. As a result, the risk of exposure to water-related pathogens, chemicals, and algal toxins will increase in recreational and shellfish harvesting waters, and in drinking water where treatment barriers break down.

Food Safety, Nutrition, and Distribution

Key Findings

- Climate change, including rising temperatures and changes in weather extremes, is expected to increase the exposure of food to certain pathogens and toxins. This will increase the risk of negative health impacts
- Elevated sea surface temperatures will lead to greater accumulation of mercury in seafood, while increases in extreme weather events will introduce contaminants into the food chain. Rising carbon dioxide concentrations and climate change will alter incidence and distribution of pests, parasites, and microbes, leading to increases in the use of pesticides and veterinary drugs
- The nutritional value of agriculturally important food crops, such as wheat and rice, will decrease as rising levels of atmospheric carbon dioxide continue to reduce the concentrations of protein and essential minerals in most plant species.
- Increases in the frequency or intensity of some extreme weather events associated with climate change will increase disruptions of food distribution by damaging existing infrastructure or slowing food shipments. These impediments lead to increased risk for food damage, spoilage, or contamination, which will limit availability of and access to safe and nutritious food depending on the extent of disruption and the resilience of food distribution infrastructure.

Mental Health and Well-Being

Key Findings

- Many people exposed to climate-related or weather-related disasters experience stress and serious mental health consequences.
- Specific groups of people are at higher risk for distress and other adverse mental health consequences from exposure to climate-related or weather-related disasters. These groups include children, the elderly, women (especially pregnant and post-partum women), people with preexisting mental illness, the economically disadvantaged, the homeless, and first responders
- Many people will experience adverse mental health outcomes and social impacts from the threat of climate change, the perceived direct experience of climate change, and changes to one's local environment.
- Increases in extreme heat will increase the risk of disease and death for people with mental illness, including elderly populations and those taking prescription medications that impair the body's ability to regulate temperature.

Populations of Concern

Key Findings

- Across the United States, people and communities differ in their exposure, their inherent sensitivity, and their adaptive capacity to respond to and cope with climate change related health threats [Very High Confidence]. Vulnerability to climate change varies across time and location, across communities, and among individuals within communities.

- People experience different inherent sensitivities to the impacts of climate change at different ages and life stages. For example, the very young and the very old are particularly sensitive to climate-related health impacts.
- Climate change threatens the health of people and communities by affecting exposure, sensitivity, and adaptive capacity. Social determinants of health, such as those related to socioeconomic factors and health disparities, may amplify, moderate, or otherwise influence climate-related health effects, particularly when these factors occur simultaneously or close in time or space.
- The use of geographic data and tools allows for more sophisticated mapping of risk factors and social vulnerabilities to identify and protect specific locations and groups of people

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1.15.3: Healthier Home, Community, Country, and World

Although climate change has enormous impacts on health, there are additional concerns and actions that you can take to increase your environmental health.

Overpopulation

Average life expectancy in 1900 was 48 years, and today that has increased to about 78 years. We have made incredible advances that have contributed to an increase our life expectancy. For example, infant mortality rates have decreased dramatically during the 20th century, from 165 deaths per 1,000 births in 1900 to 7 deaths per 1,000 births today, advances in fertility treatments have provided new opportunities for conceiving children, and people have lived safer healthier lives with advances like clean drinking water, car safety belts, and work hard hats. These advances have helped to increase our worldwide population. The world population reached 1 billion people in 1803 and in just over 100 years, that population doubled to 2 billion people in 1928. It then took only about 50 years to double the population again to 4 billion people by 1975. By 2023 the population is expected to double again to 8 billion people. With these trends in growth the population is likely to reach 8.5 billion in 2030 and 9.7 billion in 2050.

Many believe overpopulation is the root cause of environmental health issues we are facing today. It is unknown how many people the Earth can support, however scientist do believe there is a limit and that humans are negatively impact the health of the planet which in turn is causing health issues for people. Overpopulation may cause food shortages, increase rate of disease transmission due to living closer together, lack of clean water, fear of limited employment opportunities for the demand, and disappearance of nonrenewable energy, such as the estimation that natural gas will run out in the next 35 years. With current population growth trends it becomes even more important for humans to take care of the planet.

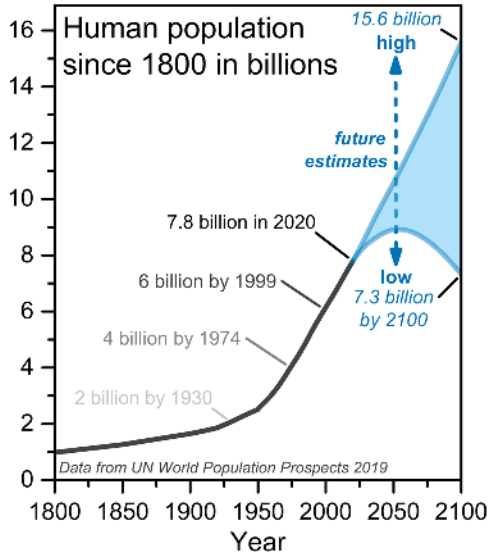


Figure 1.15.3.6: Human Population Growth since 1800

Energy Use: Fossil Fuels to Renewable Energy

All forms of electricity generation have an environmental impact on our air, water and land, but it varies. Of the total energy consumed in the United States, about 40% is used to generate electricity, making electricity use an important part of each person's environmental footprint. The total amount of greenhouse gases that are emitted into the atmosphere each year by a person, family, building, organization, or company are called the carbon footprint.

Producing and using electricity more efficiently reduces both the amount of fuel needed to generate electricity and the amount of greenhouse gases and other air pollution emitted as a result. Electricity from renewable resources such as solar, geothermal, hydropower, and wind generally do not contribute to climate change or local air pollution since no fuels are combusted.

Clean energy includes renewable energy, energy efficiency and efficient combined heat and power.

Measure and reduce your energy impact

How much energy are you using? What is your carbon footprint? How can you reduce your impact?

- Use EPA's household carbon footprint calculator to estimate your household's annual emissions and find ways you can cut emissions.
- Learn about the many ways to save in your home and track your progress with "My ENERGY STAR"
- Use Power Profiler to learn about the air emissions associated with your home or business's electricity use.
- Use AirNow to learn about local air quality.
- Use MyEnvironment to access local environmental quality information.

Waste

We all play a role in helping to prevent and remove trash in the environment. You can take action at home, school, and work to ensure a cleaner community and healthier waters.

Most of the trash that pollutes our rivers, lakes, estuaries, and oceans comes from sources on land. Plastic trash, in particular, threatens human health, aquatic ecosystems, and the economy. The most effective way to prevent trash from polluting our waterways is to reduce the amount of waste you create.

How much trash ends up in the ocean?

One of the most extreme and dramatic examples of the amount of trash that ends up in the ocean is known as the Great Pacific Garbage Patch, or "garbage island." It is is a collection of marine debris in the North Pacific Ocean between California and Hawaii[4]. The collection is estimated to be about double the size of the state of Texas.

The garbage patch was discovered in 1997 by Charles Moore. Moore had just finished a Los Angeles-to-Hawaii sail race known as the Transpac and he decided to take a short cut back to LA. He said, "on the way back to our home port in Long Beach, California, we decided to take a shortcut through the [North Pacific subtropical] gyre, which few seafarers ever cross. Fishermen shun it because its waters lack the nutrients to support an abundant catch. Sailors dodge it because it lacks the wind to propel their sailboats… as I gazed from the deck at the surface of what ought to have been a pristine ocean, I was confronted, as far as the eye could see, with the sight of plastic"[5].

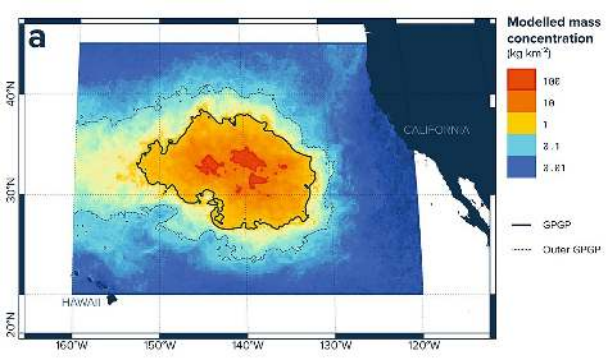


Figure 1.15.3.7: Map of the Great Pacific Garbage Patch

The 3 R's: Reduce, Reuse, and Recycle

The first goal should be to reduce your impact by reducing the energy you use, reducing the amount of waste you produce, reducing the amount of water you consume, etc.

The second goal should be to reuse as much as possible. Buy used items, repurpose items, share items with others, etc.

The last goal should be to recycle. Recycle plastics, aluminum, paper, etc to allow for them to be reused.

The following are tips to achieve the 3 R's.

- Think Green Before You Shop.
  - Do you really need it? Will you really use it?
  - How "green" is it? Is it built to last? Is it "energy star" rated? Is it made of recyclable material?
  - Can you borrow it or buy it used instead?
- Reduce your food waste by shopping smart.

  - Buy only what you need, compost food scraps, and donate unused food to food banks or shelters.
  - One-third of all food in the United States goes uneaten. The EPA estimates that in 2018, about 81 percent (about 20.3 tons) of households' wasted food ended up in landfills or combustion facilities.
  - Preventing food from going to waste is one of the easiest and most powerful actions you can take to save money and lower your climate change footprint by reducing greenhouse gas (GHG) emissions and conserving natural resources.
- Reuse or repurpose items such as old clothing, cloth grocery bags, and containers to prevent waste.
- Buy used items to reduce waste as well as the emissions created by producing new materials or disposing of them in landfills.
- Donate unused clothing, electronics and building materials to make sure others can reuse them too! One person's trash is another person's treasure. Instead of discarding unwanted appliances, tools or clothes, try selling or donating them
- Buy products made with recycled content. Check labels to see if a product or its packaging is made from recycled materials. You help close the recycling loop by buying new products made from recycled materials
- Know before you throw.
  - Know what items your local recycling program collects and encourage your household to recycle right and recycle more.
  - Unsure how to recycle? Visit Earth911-More ideas,Less waste for help
- Maintain and repair products, like clothing, tires and appliances, so that they won't have to be thrown out and replaced as frequently.
- Borrow, rent or share items that are used infrequently, like party decorations, tools or furniture.
- Learn about what you can do at home, at school, at work and in your community!

Sustainability

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment.

The National Environmental Policy Act of 1969 committed the United States to sustainability, declaring it a national policy "to create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations."

Production, processing, packaging, and transportation of food is highly dependent on the use of fossil fuels and chemical fertilizers. These can greatly harm our health and the health of the environment. As a consumer, you have power to make a difference by considering the impact of your choices. Opting for local, healthy, environmentally responsible food helps promote both personal health and overall health of the community.

Choose foods that:

- Do not harm the environment.
- Support and preserve rural communities.
- Are healthy and nutritious.
- Respect farm animals.
- Provide farmers with fair wages.
- Are free of added toxins.
- Are grown locally.
- Do not harm the health of farm workers.

What can you do?

Find out what you can do to help make a difference in our environment every day. Whether you're at home, on the go, in the office, or at school, there are many opportunities to go green by Reducing, Reusing, and Recycling.

Review the tips for home, school, work, communities, travel, and holiday/events. Identify strategies that you could implement to support a healthy planet:

- Tips for Home
- Tips for Students and Schools
- Tips for Work
- Tips for Communities
- Tips for Travel
- Tips for Holidays and Events

Healthy Community Design

The way we design and build our communities affects our physical and mental health. How can communities come together to design healthier places to work, play, and live? The American Institute of Architects, American Planning Association, American Public Health Association, American Society of Civil Engineers, American Society of Landscape Architects, National Recreation and Park Association, U.S. Green Building Council, and Urban Land Institute have come together for a joint call to action to implement healthier places.

Examples of work to create healthier places include:

- Northwest Arkansas: Turning the wheels to build biking infrastructure and access
- Phoenix: Design strategies for burning health issues
- Los Angeles: Convening new partnerships, breaking out of silos
- Salinas, California: A neighborhood's plans for a vibrant transformation
- Denver: A stormwater problem becomes a health equity opportunity
- Colorado: Broadening the discussion about health and the built environment
- Washington, D.C.: A lesson plan for health and health equity
- South Bend, Indiana: Driving results for community safety and health
- Winchester, Kentucky: Reimagining parks, health and an entire small town
- Baltimore: An alley becomes a gateway to a healthier community

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1.15.4: End-of-Chapter Material

Key takeaways for this Chapter

- Every citizen needs to be climate literate.
- The planet is warming due to the greenhouse effect, also known as global warming.
- The Earths climate is changing causing numerous problems with our weather, oceans, snow/ice, and ecosystems.
- Human health is being negatively impacted by climate change.
- Humans can take actions to increase the health of the planet

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