

Health-Enhancing Behaviors

Chapter 4

LEARNING OUTCOMES

After reading this chapter, you should be able to:

- **Define** health-enhancing behaviors and explain why they are important for good health.
- **Describe** the basic guidelines for a healthy diet and exercise plan.
- **Outline** the biopsychosocial factors that promote and create barriers to healthy diets and exercise.
- **Describe** the psychological constructs related to practicing health-promoting behaviors.
- **Explain** the health disparities that affect health-enhancing behaviors.
- **Identify** potential developmental influences on positive health behaviors.

Lacey was a healthy 130 pounds when she became pregnant at the age of 32. Excited to give her baby the best-possible start in life, she did everything she could to have a healthy pregnancy: she watched what she ate, enrolled in yoga classes for pregnant moms, and avoided alcohol, secondhand smoke, and other unhealthy situations. The only problem was her cravings. Popcorn, cheese, potato chips, and peanut butter cups, which she had always enjoyed, suddenly seemed irresistible!

Given that she was being so healthful in other areas, Lacey considered her increasing indulgence in these “treats” to be okay. Her doctor had told her that gaining up to 30 pounds during the pregnancy would actually be helpful in supporting the baby. But by the time her daughter was born, Lacey was nearly 50 pounds heavier than her prepregnancy weight. What had initially been sporadic cravings for unhealthy foods had developed into daily unhealthy habits.

Once she had recovered from the birth, Lacey resolved that it was time to return to her former, healthy weight. Applying the same enthusiasm and resourcefulness that had helped her have a healthy pregnancy, she purged her home of the salty, fatty foods she had craved. Her refrigerator and her diet once again included plenty of fruits, vegetables, whole grains, and protein. Within months, the improvements to her diet resulted in weight loss—but not nearly enough to return her to her prepregnancy weight. Was she truly living as healthfully as possible?

One day, in line at the coffee shop, Lacey overheard two new moms talking about how much fun they had had at a spinning class that morning. Perhaps high-intensity physical fitness was exactly what Lacey had been looking for. With her usual determination, she began to research fitness programs to see what might work for her. At local gyms, she tried spinning, Pilates, and barre classes, but quickly realized that she loved the CrossFit program the most. Although it was intimidating at first, Lacey realized that she loved challenging herself and working with her team and her trainer.

After two months of CrossFit, Lacey had not only lost the last of her pregnancy weight—she also was stronger and fitter than she had ever been before. She had more energy, was proud of herself, and loved the way her body felt. Most important, she felt that the good health and positive energy that being strong and fit provided made her a better parent. She was happy to promote the value of exercise and fitness to her child—and to be the best version of herself that she could possibly be.



Sisoje/Getty Images

"Fountain of Youth," Painting by Sheila Preston-Ford



Good health is a lifelong, effortful process. It is not obtainable via wishful thinking, a magic pill, or the mythological "Fountain of Youth" (as depicted in this painting by Sheila Preston-Ford).

Lacey found her way by turning to **health-enhancing behaviors**, the things we do that maintain and promote good health, well-being, and longevity. Through this process, she learned a lesson about the importance of self-efficacy—or, how to stop focusing on what you *can't* do, and to focus instead on what you *can* do.

From the Alameda County Study in Chapter 3, we know the basic behaviors that lead to good health: maintain a healthy weight; eat nutritious, balanced meals; do not skip breakfast; avoid snacking; do not smoke; drink in moderation; exercise regularly; and sleep seven to eight hours a night. All of these behaviors are important for many reasons, but most of all because they make poor health and disease less likely later on. A healthy diet and regular exercise, for example, can significantly lower the risk of obesity, heart disease, diabetes, and cancers. There is no true Fountain of Youth, but we can take steps to ensure good health and longer lives.

Now that we have an understanding of what it takes to achieve good health, we will look more closely at health-enhancing behaviors. What are they, and what predicts who will practice them? In this chapter, we will explore the behaviors that can lead to or offset chronic illness. And here and in Chapter 5, we will examine the biopsychosocial factors that lead to positive health outcomes and to negative ones, too. These factors include genetics and lifestyle, personality and behavior, social support, and cultural identity.

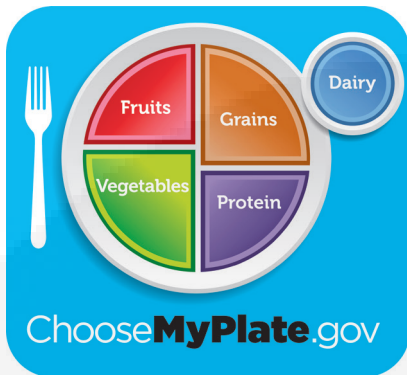
Healthy Diet

Perhaps the most crucial step toward good health is maintaining a healthy weight through diet and lifestyle (see Table 4.1). What, however, is a healthy diet? Ask your friends, and you may hear things like "eat three square meals a day" or "don't eat sugary foods." But the complete answer is much more complex. A healthy diet is one that maintains or improves your health, protects against malnutrition, and lowers the risk of chronic diseases (World Health Organization [WHO], 2018a).

Table 4.1 WHO DIETARY RECOMMENDATIONS

- | |
|--|
| 1. Try to burn as much energy as you eat, and try to eat as much energy as you burn, as healthy weight is a balance between these two. |
| 2. Increase consumption of plant foods, particularly fruits, vegetables, legumes, whole grains, and nuts. |
| 3. Limit intake of fats and oils, and avoid saturated fats (those that become solid at room temperature, such as coconut oil and most animal fats, including those found in red meat, dairy, and eggs). Prefer unsaturated fats (which remain liquid at room temperature and include most plant-based oils and foods). Eliminate trans fats. |
| 4. Limit intake of granulated sugar. |
| 5. Limit salt and sodium consumption from all sources and ensure that any salt consumed is iodized. |

Information from World Health Organization (2015a)



USDA Center for Nutrition Policy & Promotion



James McQuillan/Getty Images

The USDA created this diagram (left) to represent an ideal healthy diet, including many fruits and vegetables (right).

Dietary Requirements

The U.S. Department of Agriculture (USDA) is tasked with setting nutritional guidelines, with the aim of combating the rising rates of obesity and such chronic illness as diabetes. The USDA revises and publishes these guidelines every five years so that all Americans can be aware of what they should consume each day to be healthy and offset disease. The guidelines are also useful for institutions such as public schools, government cafeterias, hospitals, and nursing homes.

The current USDA guidelines advocate for a plant-based diet with an abundance of colorful fruits and vegetables, whole grains, seeds and nuts, low-fat or nonfat dairy, seafood, and beans. The guidelines emphasize the importance of limiting dairy, consuming only healthy oils, and avoiding saturated and trans fats. One recommendation that many Americans do not like is the cap on sugar consumption, now set to just 10% of daily calories, or fewer than 12 teaspoons per day. Right now, our average daily intake of sugars is 17 teaspoons every day (Health.gov, 2016), and includes all forms of sugar, including high-fructose corn syrup. An average 12-ounce can of cola alone has more than 10 teaspoons of sugar. That means that drinking just one can of soda can put us in danger of exceeding the daily limit! For optimal health, we should all try to avoid as much added sugar as possible.

The typical American diet has a long way to go to be healthy. With each update to the USDA guidelines, we can expect to see changes in school lunches and nutrition labels. We can also expect public health and educational campaigns to create awareness and bring about positive health behaviors.

The Impact of Fast Foods

One reason that the American diet is currently so unhealthful is our reliance on high-calorie fast foods. These foods are quick, easy, and inexpensive to eat, but they significantly increase the risks of obesity, high cholesterol, hypertension, cardiovascular

A single soft drink may contain more sugar than the USDA recommends consuming in an entire day.



Geoff Abbott/Alamy

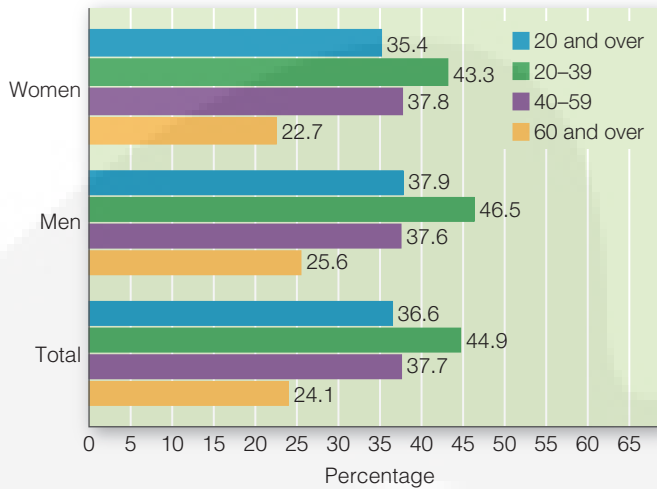


Figure 4.1: Daily Fast-Food Consumption by Sex and Age in the United States
Data from Fryar et al. (2018)

children from fast-food chains like McDonald's, Burger King, Subway, or Wendy's, usually more than twice per week (Harris et al., 2017). And on any given day, nearly 37% of Americans consume fast food (Fryar, Hughes, Herrick, & Ahluwalia, 2018; see Figure 4.1).

The Typical American Diet

The typical American diet is high in calories and low in nutrition. Most Americans barely eat the suggested amount of fruits and vegetables, much less a colorful selection of them.

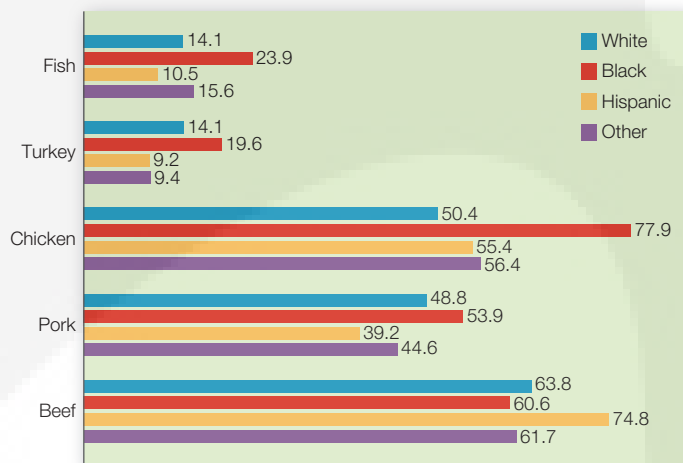


Figure 4.2: Meat Consumption by Race or Ethnicity in the United States
Data shown are in retail weight per person per year. Data from USDA, Economic Research Service (2013)

disease, diabetes, and cancer. They often contain extremely high levels of sugar and sodium, and they are often fried in saturated fats as well. The average meal from a fast-food restaurant can contain more than 800 calories.

Fast foods are made mostly from low-quality ingredients to cut costs. They are loaded with preservatives for shelf life, color additives to look appealing, stabilizers and texturizers to maintain consistency, emulsifiers to thicken, bleach to disinfect and deodorize, and softeners to give what the industry calls “mouth appeal.” (See the **In the News** feature for an example of a controversial measure that the food industry has taken to cut costs.) Processed foods also contain artificial sweeteners, which are sweeter and more cost-effective than sugar.

Nevertheless, the results are clear: We love our fast food! In one recent study, 91% of parents reported buying lunch or dinner for their

Given the sociocultural diversity in the United States today, the typical American diet is changing. For example, while overall more chicken is consumed than beef or pork (as Figure 4.2 shows), Hispanic Americans consume more beef. Gender and age differences appear in consumption as well. Men consume more calories per day than women, but also more meat (as shown in Figure 4.3). Adolescence is a period of increasing autonomy, especially in food choices, and that developmental change can affect healthy eating (Shearer et al., 2015).

Health disparities also influence food consumption. Higher levels of education and greater interest in nutrition (a health value; see Chapter 3) are related to consuming fewer calories, sugar, and carbohydrates (Ma, Ailawadi, & Grewal, 2013).



IN THE NEWS

“Pink Slime”: What’s in *Your* Hamburger?



REUTERS/Alamy

If you care about what you eat, surely you will want to know what it is that you are eating. However, that may not be as easy as you think.

There is red meat—and then there is “pink slime.” The term refers to beef trimmings, once used only in dog food and now added as filler to most ground beef. According to Gerald Zirnstein, it is found in 70% of the ground beef at the supermarket. As a scientist at the U.S. Department of Agriculture, Zirnstein coined the term. Now, as a whistleblower, he won’t buy it.

“It’s economic fraud,” he told ABC News. “It’s not fresh ground beef.... It’s a cheap substitute being added in.” Excess fat is spun out, and the remainder is sprayed with ammonia to make it

safe to eat. You probably did not plan on consuming ammonia with your hamburger, but there it is. In 2012, ABC News broadcast a news series exposing the use of “pink slime” and was sued for \$1.2 billion by the largest U.S. beef producer, Beef Products Inc., for making false claims.

Concerns over the safety of meat are not new. In his 1906 book *The Jungle*, Upton Sinclair described the workplace in the meatpacking industry in the United States. His novel created an uproar that led to important industry regulations, including the Pure Food and Drug Act that same year. Yet, in 2013, Europe was rocked by the addition of horse meat to common food. Starbucks, the coffee chain, was found to use a red dye from crushed beetles in some of its bakery and drink products. Chicken nuggets were found to contain less actual chicken meat and more of whatever is left over from meat processing. Although many of these products may not be harmful, we have a right to know what we are eating.

Debate continues over the effects of readily available nutritional information on consumer behavior. “Pink slime,” however, does not have to appear on the label. Over the objections of their own scientists, USDA officials consider it meat. If you want to try to avoid it, look out for labels such as “finely texturized beef” or “boneless lean beef trimmings”—these refer to “pink slime.” Unfortunately, unless you grind your own beef, it will be difficult to avoid “pink slime” entirely. As beef prices rise, more meat-processing plants are using it (Russell, 2014).

Question: If you eat red meat, does knowing about “pink slime” make you want to change your eating habits? How can you protect yourself from food fraud?

Developmentally, adolescents, especially African and Hispanic American teens, are disproportionately at risk for obesity and metabolic disease (Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2013; see Figure 4.4). Twenty-two percent of African American teens and 25.8% of Hispanic teens are obese compared with 14% of white teens in the United States today. And boys are more likely to be obese than girls (NHANES, 2018). Two modifiable dietary factors that influence obesity in these groups

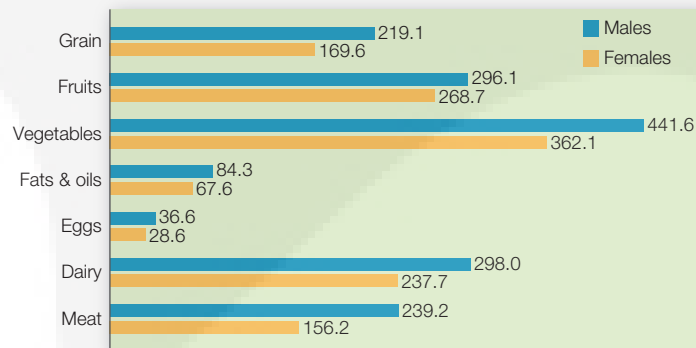


Figure 4.3: Food Consumption by Gender in the United States

Data shown are in retail weight per person per year. Data from USDA, Economic Research Service (2013)

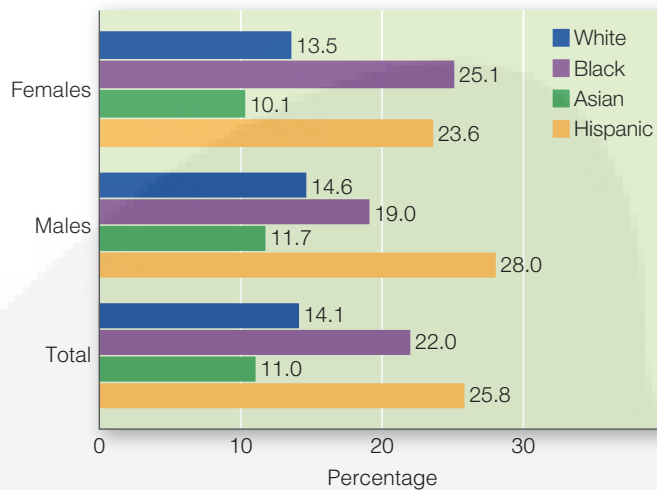


Figure 4.4: Prevalence of Obesity in Youth by Gender and Race or Ethnicity in the United States

Data from Fryar et al. (2018)

are a high intake of added sugars and a low intake of dietary fiber. For instance, African American and Hispanic American teens consume more calories from sugar-sweetened beverages than white teens (Shearer et al., 2015; Wang, Bleich, & Gortmaker, 2008).

Thinking About Health

- How does your diet compare to the USDA guidelines?
- Are you more concerned about how the food you eat is made, or about how it tastes?
- What aspects of your diet are you willing to change to enhance your health?

Diet Around the World

Geography, culture, climate, and economics all influence a population's diet and, ultimately, its health. How do we go about comparing healthy diets around the globe? One benchmark is **life expectancy**, or how long, on average, people live.

The highest number of centenarians (people aged 100 years old or older) reside in several key areas: Loma Linda, California; Nicoya, Costa Rica; Sardinia, Italy; Ikaria, Greece; and Okinawa, Japan. While each of these Blue Zones (regions whose residents live much longer than those who live elsewhere; see Chapter 3) has unique community attributes that help people maintain good health, such as an association with the Seventh-day Adventist Church (Loma Linda) or an agricultural lifestyle (Okinawa), there are commonalities across the lifestyles—and particularly within the diets—of the people who live the longest (Buettner, 2005). Not smoking, eating a plant-based diet (especially one that includes legumes), moderate physical activity, social engagement, and investment in family are the important commonalities that lead to long lives.

This woman is one of many Okinawan centenarians. Okinawans tend to live longer, healthier lives than the rest of the world because of their healthy diets.



Chris Willson/Alamy

Food Scarcity

In some countries, people are starving, and a healthy diet is nearly impossible to attain. Malnutrition is the cause of over one third of childhood deaths in developing countries where essential foods are simply unavailable (Bill & Melinda Gates Foundation, 2002). Famine, a widespread shortage of food, can be caused by poverty, crop failure and environmental pressures, political upheaval, or policy decisions. In sub-Saharan Africa, for example, famine is devastating.

Even within the United States, there is **food scarcity**. Food scarcity (or **food insecurity**) refers to having uncertain or limited access to nutritionally adequate and safe foods.

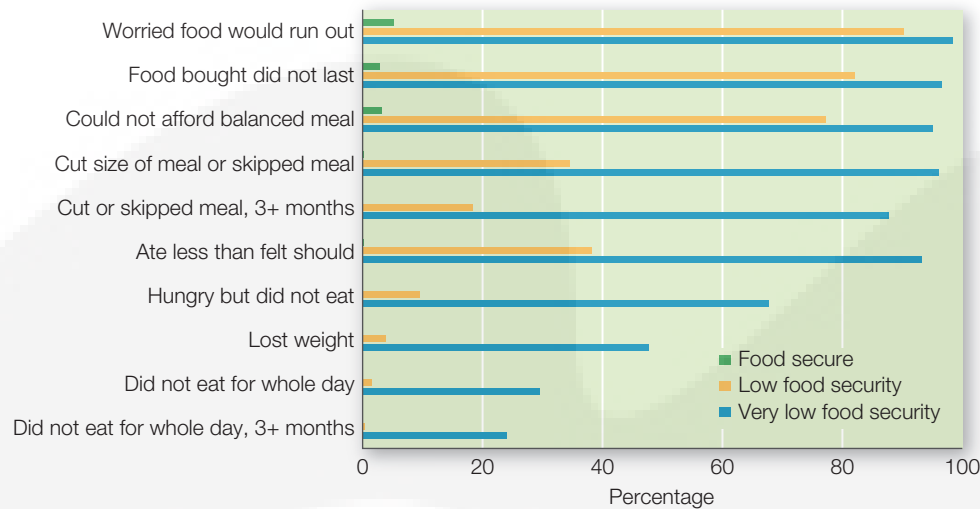


Figure 4.5: Percentage of U.S. Households Reporting Indicators of Food Insecurity by Food Security Status

Data from Coleman-Jensen et al. (2018)

Although food scarcity correlates with poverty, not everyone who experiences food insecurity is poor (Palar et al., 2018). Worldwide, 821 million people went hungry in 2017—that is one out of every nine people (WHO, 2018b). Food scarcity and malnutrition have the most devastating effect on children and the elderly.

Despite the fact that the United States has one of the largest economies in the world, many of its residents are starving; see Figure 4.5. In 2017, 11.8% of American households experienced food insecurity at some point during the year: They did not know where the next meal would come from (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018). Over five million Americans reported very low food security that significantly disrupted their eating patterns. Of these people, 99% said that they were worried that their food supplies would run out before they had money to buy more; 95% said that they could not afford to eat balanced, nutritious meals; 96% said that they'd had to cut the size of meals or skipped meals altogether to save food; and 68% reported being hungry, but unable to afford to eat (Coleman-Jensen et al., 2018). Most often, food insecurity is found in households with incomes near or below the poverty line, in single-parent households, in households headed by women living alone, in black- or Hispanic-headed households, and in rural households (Coleman-Jensen et al., 2018).

There is some good news, though. Overall, from 2014 to 2017, the number of Americans with food insecurity went down from 14% to 11.8% of households (or from approximately 17.4 to 15 million households; Coleman-Jensen et al., 2018). This is a significant improvement. However, many Americans who are taking advantage of federal food and nutrition assistance programs are still going hungry. The global and national problem of food scarcity is yet to be fully addressed.

Thinking About Health

- Which regions of the world live the longest and have the healthiest diets?
- What recommendations would you make to alleviate food scarcity, both in the United States and worldwide?

Who Eats a Healthy Diet and Why

When it comes to nutrition, education is critical, but knowledge alone is only a part of the story. A large majority of American adults (95%) already believe that balance, moderation, and variety are essential to healthy eating (van den Bree, Przybeck, & Cloninger, 2006). Research shows that most people (83%) are aware that what they eat affects their health (Lachance, 1992). Too often, however, this knowledge does not translate into behavior (Kant, Block, Schatzkin, & Nestle, 1992; Subar et al., 1995). Some studies show that only 3% of the U.S. population regularly eats the recommended amounts in each food group (Kant et al., 1992; van den Bree et al., 2006).

How do food preferences form? Biological, psychological, and social factors all help to explain why people do not make healthier choices. We generally eat what we like, what we are familiar with, and what is easily available to us. For many of us, eating is associated with family, friends, and celebration. Let's look at both genetic and environmental factors.

The Biology of Eating

Did you know that your (and Lacey's) weakness for doughnuts and potato chips may be innate? What you like to eat, when and how much you eat, and how quickly you convert food calories to energy are all dictated in part by genetics. Our predisposition toward sweet and salty foods, like our dislike of bitter and sour tastes, is in our genes. Parents even pass their own unique food likes and dislikes on to their children through their genes (Kral & Rauh, 2010). In fact, in adolescence, genes have been found to influence preferences for vegetables, fruit, starchy foods, meat or fish, dairy products, and snacks (Smith et al., 2016).

Our genetic predispositions are shaped by learning and experience. Eating habits and dietary preferences acquired in childhood last well into adulthood (Kelder, Perry, Klepp, & Lytle, 1994; Scaglioni, Salvioni, & Galimberti, 2008). Still, we are not slaves to our genes. From birth, our parents cultivate environments that may give rise to healthy eating or obesity. Your own lifestyle choices also play a large role.

How can we assess the interplay of genes and learning when it comes to diet? Twin studies have helped show how genetics influence our eating (Carnell, Haworth, Plomin, & Wardle, 2008; Smith et al., 2016). They confirm that preferences for desserts, vegetables, and fruits are highly heritable, as are preferences for high-protein foods, such as meats and fish, and a sensitivity to bitterness (Breen, Plomin, & Wardle, 2006; Kral & Rauh, 2010; Russell & Worsley, 2008; Smith et al., 2016). Strangely enough, **neophobia**, a fear of trying new things, is heritable, too (Faith, Heo, Keller, & Pietrobelli, 2013).

For our prehistoric ancestors, an aversion to strange tastes helped them avoid eating toxic things (Cassells, Magarey, Daniels, & Mallan, 2014). Today, however, neophobia can be unhealthy. It can lead to a poor diet because it reduces the variety of foods eaten (Cooke, Haworth, & Wardle, 2007; Knaapila et al., 2007). In a study of six hundred 2- to 6-year-olds, those with greater neophobia ate fewer fruits, vegetables, and meat, but neophobia was not correlated with consumption of dairy foods, cakes,

Did you know? Potato chips were invented in 1853 by Native American/African American George Crum in Saratoga Springs, New York. While working as a chef at a local resort, he was annoyed when a customer kept sending his French fries back because they were too thick. So Crum cut the potatoes as thin as possible, and the fussy customer loved them!



neil langan/Shutterstock.com

or cookies (Cooke, 2004). Not surprisingly, young children are more open to trying new cakes or cookies than new fruits and vegetables (Cooke, 2004).

Biologically speaking, the brain—specifically, the hypothalamus—controls appetite, energy use, and body weight. It adjusts our food intake in relation to our level of physical activity. That is why if you have had a particularly physically active day and burned a lot of calories, you may feel hungrier than normal. The hunger is a signal from your hypothalamus that you need to eat to replenish energy stores. Disruptions in the functioning of the hypothalamus can result in overeating.

Our genes, in large part, dictate not just our food preferences, but also our appetite, so that we meet our daily needs. Those needs, in turn, vary from person to person, depending on our **basal metabolic rate (BMR)**, the calories that the body needs to carry out such basic functions as breathing, heart pumping, converting food to energy, and sleeping.

Diet and the Environment

So, is diet driven by genes or behavior? The answer is both. For some people, maintaining a healthy weight is harder than for others, but not just because of their genetically determined appetite (Carnell et al., 2008). We all share an environment of easily accessible, super-sized foods, and yet each of us has our own history of learning.

Food preferences begin to develop in the womb. Flavor compounds are transmitted from the mother's diet to the fetus through the amniotic fluid (Beauchamp & Mennella, 2009). Still other flavors are transmitted in nursing, through breast milk or infant formula (Mennella, Kennedy, & Beauchamp, 2006). Later, parents influence not only the types and amounts of foods served, but also the social context of eating (Kral & Rauh, 2010).

Look again at neophobia. Kids can easily pick up their parents' aversion to trying things. Some parents may not make healthy foods available or may not encourage their kids to try new foods (Tan & Holub, 2012). On the other hand, pressuring kids to lose weight, to eat only healthy foods, or to eat only what the parent dictates may backfire. All may cause a child to associate eating well with stress, leading him or her to avoid it. In turn, super-picky eaters may create overprotective parents who cater to their kids (Cardona Cano et al., 2015; Johnson, Goodell, Williams, Power, & Hughes, 2015). Because these parents become anxious when their kids don't eat, they tend to serve mostly the foods that they know the child will eat (Cardona Cano et al., 2015).

Parents are important role models in children's food choices and should always encourage kids to try new things. They can allow children to make their own food choices while monitoring what they eat to make sure that they are healthy (Tan & Holub, 2012). When children observe mothers eating a new food or a food that they may previously have disliked, they are more likely to try it again (Kral & Rauh, 2010). And when parents eat healthy foods or make healthy foods readily available, children are more likely to eat them too (Cullen et al., 2003; Miller, Moore, & Kral, 2011).

The Importance of Family Dinners Something as simple as the timing of dinner can have an impact on food consumption.

This mother is encouraging healthy habits by introducing nutritious snacks at an early age.



Image Source/Getty Images

Eating after 8:00 p.m. is linked to consuming more calories, greater reliance on fast food, and obesity (Baron, Reid, Kern, & Zee, 2011; Bo et al., 2014; Jones 2018). Late eaters lose weight more slowly and are at greater risk of diabetes as well (Lopez-Minguez, Saxena, Bandín, Scheer, & Garaulet, 2018; Scheer, Morris, & Shea, 2013). They also consume fewer calories at other meals and often skip breakfast (de Castro, 2009).

Three family routines can lead to healthier eating: Regularly eating dinner together, limited time spent watching TV and playing computer and video games, and adequate nighttime sleep are all associated with a lower prevalence of obesity (Anderson & Whitaker, 2010; Taveras et al., 2012). Unfortunately, although most 12-year-olds have family meals nearly seven nights a week, only 25% of 17-year-olds eat meals with family. In families that eat fewer than three meals together a week, 45% leave the TV on while eating, and 33% say that conversation is minimal. Families that don't often eat meals together usually have less pleasant dining experiences when they do. There is also more tension within the family, and children are much less likely to think their parents are proud of them (Taveras et al., 2012). Family time around meals matters—and not just because it instills good eating habits. It is an important foundation for a child's development as well.

Thinking About Health

- What biopsychosocial factors influence your diet?
- What dietary choices and preferences may run in your family?

A Healthy Weight

The number on the scale is not the sole indicator of healthy weight. Medical professionals evaluate several other factors, such as BMI, waist-to-hip ratio, and lifestyle.

The best way to maintain a healthy weight is through regular exercise and well-balanced, nutritious meals. First, though, we need to define healthy weight—it is not just a number that you see when you step on the scale.

Body Mass Index

Medical professionals rely on several factors to determine a healthy weight. The first is **body mass index (BMI)**, a measure of your body fat based on your height and weight. You calculate BMI by multiplying your weight in pounds by 703 and then dividing by your height in inches squared:

$$BMI = \frac{\text{weight (lb)} * 703}{\text{height}^2 (\text{in}^2)}$$

For example, if you weigh 150 pounds and your height is 5'5" (65"), your BMI is $[150 \times 703 \div (65)^2] = 24.96$. There are many online BMI calculators that can help do the math.



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Table 4.2 THE INTERNATIONAL CLASSIFICATION OF UNDERWEIGHT, OVERWEIGHT, AND OBESE ADULTS ACCORDING TO BMI

	BMI (kg/m ²)	
Classification	Principal cut-off points	Additional cut-off points
Underweight	< 18.50	< 18.50
Severe thinness	< 16.00	< 16.00
Moderate thinness	16.00–16.99	16.00–16.99
Mild thinness	17.00–18.49	17.00–18.49
Normal range	18.50–24.99	18.50–22.99 23.00–24.99
Overweight	≥ 25.00	≥ 25.00
Pre-obese	25.00–29.99	25.00–27.49 27.50–29.99
Obese	≥ 30.00	≥ 30.00
Obese class I	30.00–34.99	30.00–32.49 32.50–34.99
Obese class II	35.00–39.99	35.00–37.49 37.50–39.99
Obese class III	≥ 40.00	≥ 40.00

Data from World Health Organization (2016a)

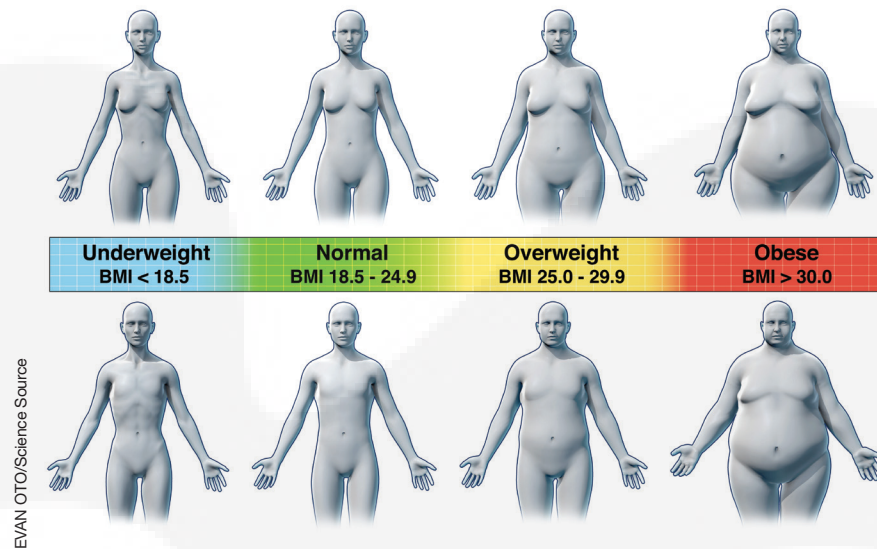
Note: Although this table is based on the calculation of BMI in meters and kilograms, it displays exactly the same cut-off points as BMI calculated with height and weight in pounds and inches.

Once you know your BMI, you can determine whether you are within a healthy range; see Table 4.2 and Figure 4.6. (Special BMI tables apply to children, because, developmentally, their bodies need a different proportion of fat to lean tissue to mature normally.) BMI is used both in scientific studies of weight (Burkhauser & Cawley, 2008) and by health care professionals.

Nevertheless, the BMI system can misclassify people (Tomiya, Hunger, Nguyen-Cuu, & Wells, 2016). BMI for adults may not always predict body fat accurately, because different people have different body shapes and proportions. BMI categories, as depicted in Figure 4.6, were constructed on “average” males and females, but BMI can overestimate the amount of body fat in athletes and people with a muscular build. Conversely, in older people or people with less muscle tone, BMI may underestimate body fat. This is because people who have a good deal of muscle weigh more. Also, BMI does not distinguish among different types of fat or where it is distributed, which may be more indicative of health.

BMI also differs across populations. BMI is less accurate at classifying men than women, and it may exaggerate the differences in obesity between white men and African American men (Burkhauser & Cawley, 2008). At the same time, it may minimize the differences between white non-Hispanic women and African American women (Burkhauser & Cawley, 2008). Many Asian people have relatively low BMIs but are still at high risk of type 2 diabetes and cardiovascular disease (WHO Expert Consultation, 2004).

Figure 4.6: Pictorial BMI Classifications



Do we need better measures of body fat altogether? As it turns out, we already have some. We can use calipers to take measurements from around the body. We can also use *dual energy x-ray absorptiometry*. This technique for measuring body composition can distinguish between the amount of body fat and lean muscle mass by sending a harmless electrical signal through the body to record the *impedance*, or resistance to the electric current. Finally, the underwater hydrostatic weighing technique uses Archimedes' principle of displacement: The more water that is displaced when a person gets into a measuring tub, the greater the body fat. We may not need to complicate our lives with measures like these, but, at the very least, BMI should be interpreted through the lens of lifestyle, age, and ethnicity.

Body Fat and BMI

BMI also cannot take into account the shape of your body or where body fat is distributed on the body.

The **waist-to-hip ratio**, based on the circumference of your waist and hips, can point to where fat is stored. The risk of poor health increases with a waist greater than 35 inches for women and 40 inches for men.

Fat around your middle (called *central obesity*) is more dangerous than fat around other parts of the body, like your hips, thighs, and buttocks. Belly fat indicates fat deposits around the internal organs (see Figure 4.7). Abdominal fat puts you at higher risk for cardiovascular disease, hypertension, diabetes, cancer, and a decline in cognitive functions (Kim, Kim, & Park, 2016; Lee, Pedley, Hoffmann, Massaro, & Fox, 2016; Sato et al., 2018; Sponholtz et al., 2016). One study followed 359,387 participants from nine European countries over nearly ten years (Pischon et al., 2008). The results were striking. When BMI was held constant, those who died had significantly higher waist-to-hip ratios than those who did not, and the larger their waistlines were, the more likely they were to die.

Fat around the waist has also been shown to set you up for forgetfulness, confusion, and dementia in later life (Whitmer et al., 2008). Those with the largest waistlines had

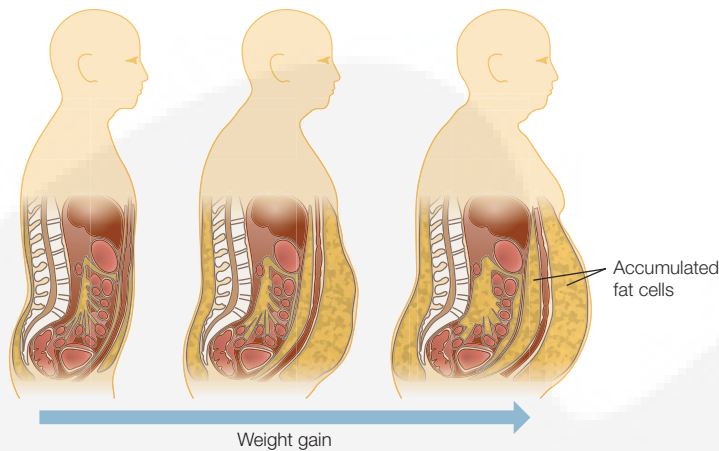


Figure 4.7: How Fat Accumulates in the Abdomen

double the risk of dementia over those with the thinnest waistlines. The greatest risk was for those who were obese with greater belly fat. Middle-aged obese people with excess belly fat had 3.6 times greater risk of dementia than did people of normal weight with low belly fat. Being overweight or obese at midlife both independently increase the risk of dementia, Alzheimer's disease, and vascular dementia later in life (Xu, Atti, Gatz, & Fratiglioni, 2011). The larger the waistline, the greater the risk.

Stress Weight

How, then, does the presence of belly fat lead to so many negative health outcomes? One explanation is that abdominal fat increases in response to stress (Rebuffé-Scrive, Walsh, McEwen, & Rodin, 1992). Weight gain in response to stress can be due to a change in eating habits, less physical activity, lower cortisol levels, or poor sleep (Geiker et al., 2018). Belly fat that develops as a result of stress is called **stress weight**.

People who tend to put on weight in the middle also tend to react badly to stress (Davis, Twamley, Hamilton, & Swan, 1999; Epel et al., 2000). The reason is that fat tissue is a strong producer of **cytokines**, the cell-signaling protein molecules that help regulate the immune system. Some cytokines (anti-inflammatory cytokines) reduce inflammation and promote healing, while others (proinflammatory cytokines) produce fever, increase inflammation, destroy tissue, and make diseases worse (Dinarello, 2000). When abdominal fat triggers a greater production of the second type of cytokines, it can lead to cardiovascular disease, diabetes, stroke, and dementia.

The Evolutionary Foundations of Fat

All fat is not created equal. Why? The puzzle is still being teased apart.

Humans began as hunter-gatherers, who had to work hard just to avoid starvation. According to the *thrifty gene hypothesis*, evolution led us to store energy as fat in good times so that we could call on it when food was scarce (Prentice, 2005). Over time, this tendency interacted with our hormones, so that men and women came to accumulate fat in different regions of the body. The “thrifty gene hypothesis” is widely known, but not universally accepted (Szabo, 2019).

Female hormones like estrogen cause women to store fat in the hips, thighs, legs, and buttocks for more successful pregnancy, birthing, and breast-feeding (Singh, 1993). Gluteofemoral fat, the fat on the butt and hips, is actually a sign of strong fertility and metabolic health. In contrast, men are more likely to accumulate fat in the abdomen and upper body (Singh, 1993). In both sexes, early humans evolved and adapted to store fat more easily, a problem for today's sedentary lifestyles and high-calorie diets.

Weight Across the Lifespan

What about today? What makes you underweight, overweight, or a healthy weight? Your weight is based primarily on the number and size of your fat cells. Both the number and the size of the fat cells are significantly larger in severely obese people than in nonobese people (Brownell, 1982). Moderately obese individuals have about the same number of fat cells as nonobese individuals, but the size of the fat cells is larger.

What determines the number, size, and distribution of our fat cells? Your physique is shaped first by genetics. However, early feeding patterns, including a lack of proper nutrition during infancy, can also influence your weight. Poor eating habits, especially in the adolescent years, but even in adulthood, can also increase the size of the fat cells. This means that childhood and adolescence are windows of vulnerability, making it especially important for parents (such as Lacey) to promote healthy food choices, balanced nutrition, and exercise.

Age-related changes affect weight gain as well. As the body changes in midlife, the metabolism slows down. Middle-aged people may consume the same amount of calories per day as they did when they were younger, but those calories will not be burned at the same rate. Unless these people reduce the number of calories they consume or get more exercise to burn the extra calories, they will slowly and steadily gain weight.

Other changes that come with age also affect body shape. Many older adults eat less than they did before, and this has risks of its own. You will recall that middle-aged adults with excess belly fat may be at risk for dementia later in life. Yet weight loss, too, may be a marker of impending Alzheimer's disease (Johnson, Wilkins, & Morris, 2006). Patients with Alzheimer's tend to be thinner than other older adults, though the reasons have long been elusive. Some men begin losing weight at least six years prior to receiving the diagnosis of Alzheimer's disease (Stewart et al., 2005). Why might weight loss relate to the development of Alzheimer's disease? First, the disorder may cause older adults to forget when to eat. Second, it may cause apathy, anxiety, irritability, or depression, all of which can reduce appetite and the ability to prepare food (Feldman & Woodward, 2005; Grundman et al., 2004). Third, the disease may cause atrophy in areas of the brain that regulate appetite, energy expenditure, and a stable body weight (Grundman, et al., 2004).

Regardless of your age, maintaining a healthy weight is crucial for offsetting disease and disability. A healthy, nutritious, balanced diet is the key.

Thinking About Health

- What is your genetic predisposition to storing fat? Are you at risk of certain health outcomes as a result of your fat distribution?
- Given the evolutionary influences on fat storage, can you imagine how our current lifestyles will shape the way humans continue to evolve in the future?
- What are some of the negative health outcomes associated with being overweight or obese?

Who Maintains a Healthy Weight and Why

So far we have considered how genes, family, stress, and age influence what we eat, our body fat, our metabolism, and the shape of our bodies. However, our sense of control, self-efficacy, and personality also influence whether we are able to maintain a healthy weight.

Self-Control and Self-Efficacy

Many of us think of gaining weight as a matter of poor self-control (Wills, Isasi, Mendoza, & Ainette, 2007). **Self-control** is the ability to control desires, emotions, and behaviors (Carver, 2004). It involves overriding our habitual or automatic responses and our strong impulses (Gailliot & Baumeister, 2018). It takes self-control not to pick up that candy bar at the grocery store, just as it took self-control for Lacey to purge her home of unhealthy foods after her pregnancy. Self-control is one form of conscious self-regulation, and, from a biological standpoint, can be traced to brain functioning—specifically, the anterior cingulate cortex in the prefrontal cortex (Banfield, Wyland, Macrae, Münte, & Heatherton, 2005). Although self-control was previously thought to be a personality trait (Tangney, Baumeister, & Boone, 2004), more recently it has been considered a limited resource. Each act that requires self-control can decrease that resource, making it harder to maintain will-power (Gailliot & Baumeister, 2018).

Faced with sweets and other tempting foods, those with less self-control end up eating more or failing to stick to a diet. They often make unhealthy choices and have greater difficulty losing weight (Crescioni et al., 2011). People who are higher in self-control are more likely, for example, to report eating breakfast regularly (Junger & Van Kampen, 2010). And those who have higher self-control also tend to have lower BMIs (Junger & Van Kampen, 2010; Konttinen, Haukka, Sarlio-Lähteenkorva, Silventoinen, & Jousilahti, 2009). In longitudinal studies, children with less self-control were more likely to become obese as they got older (Duckworth, Tsukayama, & Geier, 2010; Francis & Susman, 2009). Higher levels of self-control also bolster those who want to lose weight, helping them stick to their diets (Crescioni et al., 2011).

Self-efficacy is a belief in one's ability to succeed or reach a goal (Bandura, 1995), and it can help greatly with weight loss and maintenance (Clark, Abrams, Niaura, Eaton, & Rossi, 1991; DePue, Clark, Ruggiero, Medeiros, & Pera, 1995; Elfhag & Rössner, 2005; Rodin, Elias, Silberstein, & Wagner, 1988; Stich, Knauper, & Tint, 2009). It is related to our health goals and to our possible selves (see Chapter 3). Self-control in the face of temptation is enhanced when you are confident that you will not give in. Self-control and self-efficacy go hand in hand in eating and weight management.

Personality and Eating

In addition to self-control and self-efficacy, other dimensions of personality may contribute to diet. Is there a personality type related to obesity? One study found that people with an aggressive personality were more likely to have an unhealthy diet and less likely to stick to positive dietary changes (Milligan et al., 1997). Early studies also found links between obesity and impulsivity, boredom, a pessimistic attitude, and anxiety (Fassino et al., 2002).

Other studies single out five personality traits: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (Costa & McCrae, 1984). These traits,

often called the **Big 5**, are found to some degree in most adults, and most of us have some blend of all of them. They influence how a person experiences the world and copes with stress, and they can have a major impact on healthy behavior.

Someone high in **neuroticism** tends to experience negative emotions, such as anxiety, anger, worry, self-consciousness, and guilt. Even psychologically stable people may be high in neuroticism. Neuroticism is related to higher BMIs (Terracciano et al., 2009). **Extraversion** is the tendency to be outgoing, warm, and sociable. Although it has not been found consistently to relate to weight, some studies have found that extraverted people have higher BMIs (Kakizaki et al., 2008; Magee & Heaven, 2011). In contrast, more conscientious individuals may have lower rates of obesity and lower BMIs (Brummett et al., 2006). **Conscientiousness** is characterized by feeling more comfortable with rules and expectations, and highly conscientious people may be less likely to indulge or overeat: They choose to do things that are health-enhancing (Goldberg & Strycker, 2002).

Taken together, these studies suggest links between personality traits and weight, but why? It could be that being obese affects personality, taking its toll on one's emotional state. In this way, a high BMI may lead one to experience greater levels of negative emotions. Alternatively, personality, established early in life, may influence eating habits and the tendency to gain weight.

Patterns of Eating

Personality also influences weight through lifestyle choices and eating behaviors (Elfhag & Morey, 2008; van Strien, Frijters, Bergers, & Defares, 1986). **Restrained eaters** consciously restrict their eating to control their caloric intake and body weight (Cavanaugh, Kruja, & Forestell, 2014; Houben, Nederkoorn, & Jansen, 2012). **Emotional eaters** tend to eat in response to negative emotions such as anxiety, anger, depression, disappointment, and loneliness. Finally, **external eaters** eat in response to *food cues*, such as the sight, smell, and taste of foods.

Emotional and external eating styles are associated with higher body weight (Elfhag & Linné, 2005) and more unhealthy consumption of foods high in calories, fat, and sugar (Elfhag, Tholin, & Rasmussen, 2008; van Strien, 2000). Emotional eaters likely overeat in response to a variety of cues, not limited to negative emotions (Bongers, de Graaff, & Jansen, 2016). In one study, across four different conditions—(1) a negative mood manipulation (listening to sad music), (2) a positive mood manipulation (listening to happy, upbeat music), (3) food exposure (their favorite foods and snacks), and (4) a control condition (time spent solving puzzles)—emotional eaters ate more than nonemotional eaters, especially when they were experiencing negative emotions, regardless of the food cues (Bongers et al., 2016). Some research shows that people who have difficulty regulating their emotions, especially anxiety, are more likely to be emotional eaters, and this is linked to higher rates of disordered eating (Frazier & Hayes, 2019). Does this research confirm the role of negative emotions in eating? The jury is still out. To complicate things further, external eaters are not more likely to be obese (Rodin, 1981), although they may still have weight problems.

Where do different eating styles come from? According to one theory, emotional eating relates to depression and has its roots in early childhood (Elfhag & Morey, 2008). Mood, however, is not the whole story, even for emotional eaters. They also tend to have less self-control, be less conscientious, and be more easily discouraged. Another

useful term here is *impulsiveness*, the inability to resist desires, control urges, and tolerate frustration (Piedmont & Ciarrochi, 1999). As we saw earlier in this chapter, not allowing children to eat certain things, like sugary cereal or cookies, can backfire. It can increase a child's impulsiveness and lead to weight gain (Rollins, Loken, Savage, & Birch, 2014). Adolescence, a highly emotional period, is a critical period in the development of unhealthy eating behaviors and eating disorders (Zhu, Luo, Cai, Li, & Liu 2014). For emotional eating, the family environment is critical.

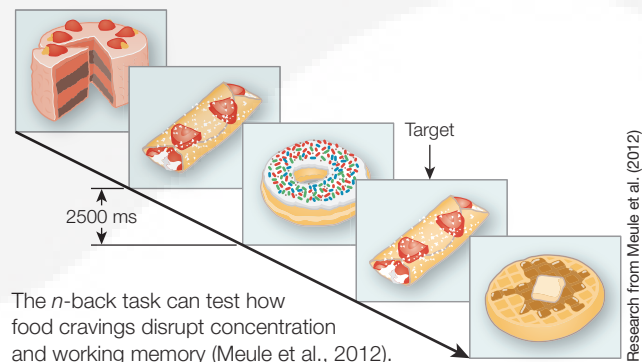
External eaters, who are susceptible to food cues (Schachter, Goldman, & Gordon, 1968), also tend to be higher in neuroticism (although not as much as emotional eaters), be impulsive, and be less self-disciplined. Personality, especially a tendency toward external eating patterns, lies behind the “what-the-hell-effect” (Baumeister & Tierney, 2012), or *counterregulatory eating*. Suppose that you are watching your weight, but you go out to dinner for your friend's birthday. You've shared appetizers and eaten a huge meal, and then the dessert cart comes. You are stuffed and know that you shouldn't have a dessert, but then you think, “I've already blown my diet, so I might as well.” As this example suggests, often people can monitor their eating quite well until the very day they indulge—and then their resolve goes out the window (Baumeister & Tierney, 2012; Gailliot & Baumeister, 2018). This effect is bad for diet, health, and morale, and is psychologically similar to the abstinence violation effect (see Chapter 3).

Food cravings can exhaust our cognitive resources and create cognitive impairments (Meule, Skirde, Freund Vögele, & Kübler, 2012). In other words, food cravings make it difficult to concentrate and interfere with working memory. To test this, scientists have used a technique called the *n*-back task. Here, participants are presented with a series of pictures of high-calorie sweet and savory foods and neutral objects and asked to indicate whether each matches a picture that they have seen before. People who have food cravings (especially for chocolate!) show slower reaction times and make more errors when given pictures of unhealthy food than of something less crave-worthy.

If we are all vulnerable to the appeal of food, how do restrained eaters manage not to indulge in overeating? They carefully monitor the types of foods they eat, the amount of calories they consume, and their overall weight (Boschi, Iorio, Margiotta, D'Orsi, & Falconi, 2001; Elfhag & Linné, 2005; Lowe, Doshi, Katterman, & Feig, 2013). They may also be more effective at losing weight (Elfhag & Morey, 2008).

But even restrained eating can be bad for health. It may relate to greater neuroticism, especially in children and teenagers (Heaven, Mulligan, Merrilees, Woods, & Fairouz, 2001). Continual restraint may signify body dissatisfaction and struggles with food and eating, and may even put us at risk of eventual overeating and eating disorders (Stunkard & Messick, 1985; Tuschl, 1990). In sum, restraint in the face of temptation is good, but if we are overly strict with what we eat all the time, we may eventually be overwhelmed by temptation.

Do you eat when you feel hungry? Do you eat only until you feel satisfied and full? If so, you are an **intuitive eater**. Intuitive eaters eat when they feel hunger and stop eating when they feel full (Tribble & Resch, 2003; Tylka, 2006; Young, 2010). They are not preoccupied with food and dieting, and they do



Samuel Borges Photography/Shutterstock



Some people actually crave healthy foods: intuitive eaters.

not restrict their food choices based on whether foods are “good” or “bad.” Yet they often end up choosing healthier foods and maintaining a healthy weight. They also have less chronic dieting, binge eating, and other disordered eating behaviors. They eat what their bodies need. Among healthy young adults, men are more trusting of their bodies to tell them when and how much to eat (Denny, Loth, Eisenberg, & Neumark-Sztainer, 2013).

Intuitive eating is generally healthy eating. In contrast, extensive food restriction stands in the way of the body’s normal cues. The more people diet, the less they are in tune with hunger and satiety, and that puts them at risk for disordered eating (Costanzo, Reichmann, Friedman, & Musante, 2001; Herman, Polivy, Lank, & Heatherton, 1987).

As we can see, many different attributes, beliefs, and behaviors have been examined to predict positive and negative health outcomes with regard to food and eating (Kerin, Webb, & Zimmer-Gembeck, 2019). Understanding the patterns that emerge when various behaviors come together is important for helping people eat more healthfully and create optimal health outcomes (Kerin et al., 2019).

Thinking About Health

- What psychosocial, cognitive, and personality factors influence eating behaviors?
- Can you identify the potential problems that arise from restrained, emotional, external, and intuitive eating patterns?
- If you have tried dieting, has it worked for you? Why or why not?

The Importance of Exercise

If you want to live longer, exercise. If you want to be healthier, exercise. If you want to avoid cardiovascular disease, cancer, diabetes, and many other chronic and debilitating diseases, exercise. If you want to lose weight, exercise. If you want to have less stress and sleep better ... you get the point.

The costs of inactivity are high. Worldwide, physical inactivity costs \$117 billion per year in health care and lost productivity (Ding et al., 2016). According to one study of more than 26,000 American adults, those who exercised regularly (at recommended levels) paid \$2,500 less in health care costs annually than did those who did not (Valero-Elizondo et al., 2016). So, exercising is not only good for your health—it is also good for your bank account!

How Much Exercise Is Enough?

The *Physical Activity Guidelines for Americans* are the evidence-based federal guidelines for physical activity for anyone (aged 3 years old or older) to improve health and offset disease and disability. Revised in 2018, the guidelines define **physical activity** as “anything that gets your body moving.”

However, the guidelines now urge two complimentary types of physical activity each week (see Figure 4.8). **Aerobic exercise (or cardio)** raises your heart rate and strengthens

the heart and lungs. Cardio gets your heart pumping and gets you breathing harder. You want to reach an intensity at which you “break a sweat.” **Resistance training (or strength training)** builds muscle mass and conditioning. It is as simple as using your own body weight to build muscle mass—think sit-ups, push-ups, squats, and lunges! The minimum recommendation for healthy adults is 150 minutes per week of aerobic exercise at moderate intensity and strength training two or more days per week. That training should include working all major muscle groups—legs, hips, back, chest, abdomen, shoulders, and arms. And for those of us who find it hard to work exercise into our busy schedules, there is great news: You do not need to exercise every day to get the benefits (O’Donovan, Lee, Hamer, & Stamatakis, 2017). Just one or two sessions per week can reduce mortality, heart disease, and cancer. Just move!



Figure 4.8: Physical Activity Guidelines for Americans
Data from U.S. Department of Health and Human Services (2018)

The Overall Benefits of Exercise

Lacey’s story at the start of this chapter is an example of the benefits of strength training and conditioning. What she was able to accomplish after her pregnancy was admirable, but not remarkable—anyone can perform and benefit from regular physical activity. Whether walking the dog or running a marathon, exercise provides long-term health benefits for everyone.

The significance of exercise for a healthy lifestyle cannot be understated. At any age, exercise provides many healthful benefits beyond weight control and weight loss. It also prevents or delays such conditions as osteoporosis, high blood pressure, diabetes, and heart disease. Exercise even helps to improve memory and to offset memory problems in older adults. In the brain, it elevates levels of neurochemicals, like serotonin, that increase feelings of well-being, decrease stress, and buffer against anxiety and depression. In fact, research shows that exercise stimulates the growth of new stem cells in the brain (Blackmore, Golmohammadi, Large, Waters, & Rietze, 2009). Active children sleep better, do better in school, and feel better about themselves, not to mention that kids who exercise are on a path to greater health throughout their lives.

The benefits of exercise, then, are physical, cognitive, and mental. So are the costs of a sedentary lifestyle. Let’s look at each in more detail.

The Physical Benefits of Exercise

Aerobic exercise increases the efficiency of the **cardiorespiratory system**, which includes the heart and lungs, improving their ability to transport blood and oxygen through the body. Go for a jog and you can feel the effects of exercise on your heart and lungs immediately. Within the cardiovascular system, exercise improves blood flow, reduces resting



Monkey Business Images/Shutterstock

Exercise with a friend!
You will be more
inclined to stick to your
exercise routine.

heart rate, reduces blood pressure, improves cholesterol level (increasing high-density lipoprotein, or “good cholesterol”), and strengthens the heart itself so that it pumps more blood per beat. A strong heart is a healthy heart. Good heart health reduces the risk of heart disease, stroke, diabetes, and hypertension.

In the **respiratory system**, which carries oxygen-rich blood throughout your body, regular exercise increases maximum oxygen consumption and improves lung capacity. Although exercise doesn’t change the lungs themselves, it does make them more efficient at *using* oxygen. Exercise also helps to strengthen your **immune system**, which defends against disease-causing microorganisms (Miles, Huber, Thompson, Davison, & Breier, 2009). When your immune system is weakened, it becomes more vulnerable to invading germs and bacteria. And when your immune system is strong, you enjoy better health. The risk of catching a cold or flu, or having a severe bout of either if you do get sick, is lower if you exercise moderately.

The Cognitive Benefits of Exercise

Regular exercise positively influences **cognitive functioning**, the processes concerned with knowing, perceiving, attention, and remembering.

Moderate-intensity exercise leads to improvements in reaction time, executive functioning, and working and short-term memory functioning. Across the lifespan, research shows the benefits of exercise on cognition (Colzato, Kramer, & Bherer, 2018). For example, aerobic exercise throughout childhood is beneficial for attention and performance (Raine et al., 2018). In adolescence, and especially in the classroom, regular exercise promotes attention, task-related concentration, and achievement of goals (Ludyga, Pühse, Lucchi, Marti, & Gerber, 2019). In older adults, in particular, the evidence is growing that physical activity and physical fitness are associated with better cognitive functioning (Peven, Grove, Jakicic, Alessi, & Erickson, 2018), enhanced brain functioning (ten Brinke, Hsu, Best, Barha, & Liu-Ambrose, 2018; Voss et al., 2010), prevention of brain atrophy (Colcombe et al., 2006), and even growth and regeneration among neurons and greater plasticity in the brain (Greenwood & Parasuraman, 2010). *Plasticity*, or *neuroplasticity*, refers to a process in which neural pathways in the brain reorganize, or new pathways develop in response to experience. Given the evidence, some gerontologists argue that exercise can promote brain growth in seniors (Liu-Ambrose, Nagamatsu, Voss, Khan, & Handy, 2012). Not only does exercise significantly decrease age-related cognitive impairment, but it may also offset and slow the progression of Alzheimer’s disease (Weinstein et al., 2012).

At any age, the evidence shows that physical exercise can promote positive changes and offset neurodegeneration in the brain, providing enormous benefits for cognitive functioning and well-being (Mandolesi et al., 2018).

The Mental Health Benefits of Exercise

People who exercise regularly also enjoy better mental health. Exercise is immediately uplifting, and has long-term benefits for emotional well-being. Even a single session of exercise reduces self-reported anxiety and depression and increases positive mood

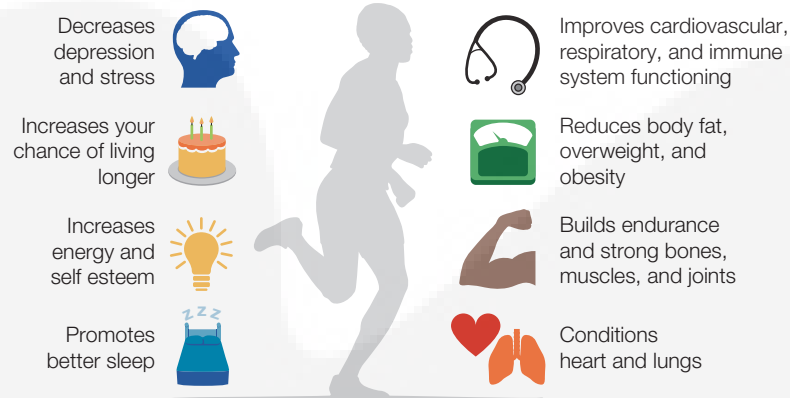
(Anderson & Brice, 2011; Steptoe & Cox, 1988). It can take only 10 minutes of walking to lift yourself out of a funk (Anderson & Brice, 2011; Ekkekakis & Petruzzello, 2000; Hansen, Stevens, & Coast, 2001). And the positive effects of exercise continue to boost mood for up to 24 hours afterward (Sibold & Berg, 2010). After a 10-week exercise program, participants experienced significantly improved self-esteem as well (Desharnais, Jobin, Côté, Lévesque, & Godin, 1993). All else being equal (age, health, income level), people who exercised had one to five fewer days of poor mental health than did those who did not exercise (Chekroud et al., 2018). The benefits are strongest when people exercise 30 to 60 minutes per day for three to five days a week. And not all exercise is equally beneficial—popular team sports and cycling are best! (Chekroud et al., 2018).

People who suffer from mood disorders, such as depression, can benefit from exercise. Those who are physically active are less likely than those who are inactive to become depressed (Otto et al., 2007). In a clinical trial, patients with major depressive disorder were assigned randomly to one of four conditions: supervised exercise, home-based exercise, antidepressant therapy, or a placebo pill (Blumenthal et al., 2007). Remarkably, exercise turned out to work as well as pharmacological treatment. After the first four months of treatment, patients in the exercise groups experienced less depression and greater remission of their symptoms, equivalent to those taking antidepressant medications and greater than those taking placebos. One year later, the people who continued to exercise still had lower rates of depression than their less-active counterparts (Blumenthal et al., 2010). In another study, people who had recently recovered from an episode of major depression, but who were still experiencing bouts of sadness, were prescribed 15 minutes of acute physical exercise daily. Even this little bit of exercise helped protect against life's stressors. As exercise levels increased, so, too, did mood and patients' abilities to cope with difficult life situations (Mata, Hogan, Joormann, Waugh, & Gotlib, 2013).

Exercise is also beneficial for treating and perhaps preventing anxiety. Some people are said to experience *anxiety sensitivity*: They have a heightened awareness of the physiological cues of anxiety, including increased heart rate, rapid breathing, and perspiration—a “fear of fear” (Reiss, Peterson, Gursky, & McNally, 1986). And these people are also at greater risk of panic attacks. Exercise may offset that sensitivity (Smits et al., 2008). In one study, participants learned to associate the physiological cues with exercise instead of threat or danger. Other researchers simulated an anxiety attack in participants by exposing them to carbon dioxide, which triggers increased heart rate, breathing, dry mouth, and dizziness. Physically active participants were less likely to panic (Smits, Tart, Rosenfield, & Zvolensky, 2011).

Furthermore, exercise has been found to increase the quality of life for those who suffer from chronic illnesses. Thirty-six studies examined in a meta-analysis showed that, for women undergoing breast cancer treatments, it didn't matter what kind of exercise they did—any exercise improved their quality of life (Zhang, Li, & Liu, 2019). For patients with pulmonary fibrosis (a lung disease), exercise lessened symptoms (Wittman & Swigris, 2019). In patients with multiple sclerosis, aerobic exercise improved cognitive functioning, lifted depression, and reduced fatigue (Sandroff, Pilutti, & Motl, 2019). And for Parkinson's patients, who may have difficulty moving, exercise in many forms can be helpful. From aerobics to yoga to tai chi, the benefits are massive (Raje et al., 2019). These are just a few of the many recent studies showing how exercise, even in the context of disease, can have positive benefits.

The Benefits of Exercise



Sitting Too Much Can Be Lethal

Although exercise is important, the amount of time we spend sitting around is also a powerful predictor of health—for the worse. Among middle-aged Scottish men, those who reported spending two or more hours a day sitting at a screen had two times the risk of heart attack and other heart problems (Stamatakis, Hamer, & Dunstan, 2011). More troubling still, those who spent four or more hours watching TV and using computers were 50% more likely to die (of *any* cause) than were those who were less sedentary, even if these men also exercised. Over the course of a week, men who spent more than 23 hours sitting (watching TV or sitting in their cars while commuting) were more likely to die of heart disease than those who spent 11 hours or more a week being more active (Owen, Healy, Matthews, & Dunstan, 2010).

Without question, today's work environment has changed everything. Many more people spend time sitting while commuting to work or while working at an office computer. What is striking about the Scottish study is that the sedentary time was leisure time, or *discretionary* time. Those men chose to spend those hours in front of their TVs. Thus, lifestyle choices are key to health.

Thinking About Health

- Do you think that the U.S. government's guidelines for exercise are an effective framework for maintaining good health?
- What are some of the many benefits of exercise? How do you benefit from exercise?

Who Exercises and Why

Individuals who were active in sports as children continue to exercise throughout their lives. Some research shows that the people who enjoy exercise come from families in which physical activity is valued—exercise is something that family members do together.

One crucial factor here is self-efficacy: Those who feel capable of exercising do it and benefit from it. Finally, once physical activity on a daily basis becomes a habit, maintaining that lifestyle is easier.

Still, many more do not get enough exercise. An online search shows that in 2017, 38,477 health clubs existed in the United States, and more than 60 million Americans had gym memberships. Yet, on average, 80% of Americans do not get the recommended amount of physical activity (Piercy et al., 2018). And Americans are not alone. Lack of exercise may be a factor in 1 of 10 premature deaths around the world each year—roughly equivalent to the number of deaths caused by smoking.

Barriers to Exercise

Why don't people get enough exercise? In one survey (Sallis et al., 1992; Sallis & Howell, 1990), the 10 most common reasons for not exercising were the following:

1. Lack of time
2. Inconvenience
3. Lack of self-motivation
4. Not enjoying exercise
5. "Exercise is boring"
6. Low confidence in one's ability to be physically active
7. Fear of injury or recovering from injury
8. Inability to set personal goals and monitor progress
9. Lack of encouragement, support, or companionship from family and friends
10. No safe, convenient place to exercise

Additionally, people report that cost, fatigue, family, work, and other obligations make it hard to prioritize physical activity (Salmon, Owen, Crawford, Bauman, & Sallis, 2003). But people who report enjoying physical activity are twice as likely to make time for it (Salmon et al., 2003).

How can motivation tip the scales in favor of exercise? Think back again to Lacey—a typical person with a busy life and many demands on her time. Imagine what barriers she had to overcome in order to work out and become strong. Can you think of some of the ways in which exercising helped her, beyond just losing the weight that she gained during pregnancy? Think of the ways in which strength training and the commitment to exercise gave her life new purpose and meaning. Do you find her story motivating?

Cross-Cultural Differences in Exercise

Although the health-club trend developed in the United States, people exercise all over the world. In fact, some unique trends are found in other countries.

In China, walking backward is a common way to exercise, as it benefits leg muscles that are not normally used. It also improves balance and posture, and—according to ancient rumors—can reverse your karma and offset senile dementia. In Japan, every morning, Radio Taiso broadcasts a series of warm-up and stretching exercises designed to raise energy levels and unite people in promoting good health. Students, employees,



“Laughter yoga” not only exercises the body, but can also lift the spirit!



and family members all stop what they are doing and perform these morning exercises together. Capoeira, a Brazilian tradition, combines dance, acrobatics, music, and martial arts in a form of exercise that increases strength and flexibility, while improving balance, coordination, rhythm, and heart health. Capoeira was thought to be invented by African slaves who were actually practicing martial arts while pretending to dance.

Another form of dance that is great exercise is belly dancing, often found in the Middle East. It is both a cardiovascular exercise and a great strengthening workout for core abdominal muscles. Yoga, an ancient form of physical and mental discipline, is practiced in India to gain harmony between the body and the mind. There are many different kinds of yoga, but all of them increase flexibility, tone the muscles, and help to achieve peace of mind. In contrast to the calming effects of yoga, today the hottest workout in Delhi is “laughter yoga.” Hundreds of people gather to giggle, guffaw, and whoop it up. Maybe laughter really is the best medicine.

Thinking About Health

- What are some of the barriers to exercise?
- How can you eliminate the barriers that make exercise hard for you?

Sleep

In addition to a healthy diet, weight management, and physical activity, sleep is crucial for cognitive, emotional, and physical functioning. As an Irish proverb says, “A good laugh and a long sleep are the best cures in the doctor’s book.” Yet most people do not get nearly enough sleep to be fully functional during the day.

Sleep’s Benefits and Sleep Debt

Although everyone is different, on average, healthy adults need seven to eight hours of sleep each night. Those who sleep only four or five hours each night experience significant

negative physical and behavioral consequences. Not sleeping enough or getting a bad night’s sleep is related to high blood pressure, weakened immune system functioning, and higher risk of diabetes, stroke, cancer, and cardiovascular disease. It also negatively impacts mood, sex drive, and weight gain. However, those who sleep more than seven or eight hours per night may have higher mortality rates than those who sleep fewer hours (Knutson, 2010; Youngstedt & Kripke, 2004). An Australian study, by far the largest ever done in the Southern Hemisphere, found that a person who sleeps too much, sits too much, and isn’t physically active is more than four times as likely to die early (Ding et al., 2016). As the study’s author put it, “When you add the lack of exercise into the mix, you get a ‘triple whammy.’”

Feeling alert and well rested depends on getting those seven to eight hours of sleep night after night. Without that, you may suffer from the cumulative effects of loss of sleep over time, or **sleep debt**. Just a few nights of poor sleep will cause you to go into sleep debt.

Sleep debt may have serious consequences on your daily functioning and your long-term health and well-being. Not getting enough sleep on a regular basis can lead to significant impairments in attention, reaction times, learning, and memory; increased risk of auto accidents, substance abuse, and psychiatric conditions; an increase in BMI; and a greater likelihood of being overweight or obese. One recent study showed that middle-aged adults who got fewer than six hours of sleep a night developed plaques in their arteries (Domínguez et al., 2019), characteristic of the development of atherosclerosis, or heart disease (see Chapter 9). Once again, however, getting too much sleep may not be beneficial, either. Clearly, sleeping too little and sleeping too much are both bad for your health.

Differences in the Need for Sleep

There are many individual differences in the amount of sleep needed, because each of us has our own unique **circadian rhythm**—the biological cycles that carry us from day to night and night to day. There are also substantial differences in the optimal amount of sleep needed across the lifespan, as Table 4.3 shows.

Some research shows that women sleep more than men (Burgard & Ailshire, 2013).



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Table 4.3 AVERAGE SLEEP NEEDS FOR DIFFERENT AGE GROUPS	
Age	Sleep Needs (hours)
Newborns	12–18
Toddlers	14–15
School-age children	12–14
Infants	11–13
Preschoolers	10–11
Teens	8.5–9.25
Adults	7–9

Data from National Sleep Foundation (2015)

Optimal sleep duration is longest early in life, with newborn infants spending 18 of 24 hours sleeping. This amount of sleep is crucial for early development. However, as children age, their sleep needs change, and adolescents can manage on eight-and-a-half to nine-and-a-half hours of sleep. People often find that their sleep becomes lighter and less restful with age, so that those older than 65 may need more sleep each day than when they were younger. Many older adults also have chronic medical conditions that may interfere with sleep. As a result, many older folks nap more, which, unfortunately, may make nighttime sleep more elusive. Older adults also spend less time in deep sleep—the stage of sleep with the most benefits.

The Architecture of Sleep

A good night's sleep involves passing through several important stages. In addition, there is a major distinction between two types of sleep, called REM and NREM.

Each stage of the **sleep cycle** is differentiated by the type of brain waves observed and other physiological characteristics. The cycle begins each night when the body signals that it is time to sleep by boosting the circulating levels of *adenosine*, the neurotransmitter that signals readiness to sleep. Adenosine effectively powers down the body's waking functions, such as attention, memory, and reactions to physical stimuli. As circulating levels of adenosine increase, our feelings of drowsiness increase, and we begin to enter **NREM (non-rapid eye movement) sleep**. It is during this phase that the first three states of sleep occur. *Stage 1 (or N1) sleep* is characterized by slow eye movements and slow relaxation of the voluntary muscles (arms, legs, face). Some people experience sudden jerky movements during this stage, known as **hypnic myoclonia (or myoclonic jerks)**. These “sleep starts,” which may feel like falling, happen when the motor areas of the brain receive spontaneous activation. Usually this transitional period is brief, lasting between 5 and 10 minutes. During a full night's sleep, Stage 1 accounts for 5% of our total sleep. People who wake up during this period do not even feel as if they had been sleeping.

Next, we move into *Stage 2 (or N2) sleep*. During this stage, we become less aware of our surroundings, our body temperature drops, and our breathing and heart rates slow. This stage lasts for about 20 minutes each time we cycle through it, accounting for nearly 50% of our time asleep, total. During Stage 2 sleep, brain waves become more rapid and rhythmic and produce little bursts of activity known as **sleep spindles**. Sleep spindles are linked to neurologic activity, which is thought to help the integration of new information into our knowledge base. It also facilitates memory processing (Saletin, Goldstein, & Walker, 2011; Tamminen, Lambon Ralph, & Lewis, 2013). Recent research has also discovered that changes in N2 sleep can be indicative of later disease. Older adults who show a reduction in N2 sleep and changes in sleep spindles may develop cognitive impairment (Taillard et al., 2019). Sleep studies that examine sleep spindles as biomarkers may help to identify older people at risk for dementia.

Perhaps even more astonishing is the finding that, during Stage 2 sleep, the brain gets a nightly bath! During N2 sleep, channels in the brain open, and cerebrospinal fluid (CSF) flows in and cleanses the brain, washing away the daily accumulation of metabolic waste (Iliff & Nedergaard, 2013; Nedergaard, Iliff, Benveniste, & Deane, 2018). When this waste is not removed, plaque can build up in the brain, leading to Alzheimer's disease,

stroke, and other dysfunction. Poor sleep and a lack of N2 sleep can have long-term negative impacts on health.

When the brain waves become deep and slow (high-amplitude delta waves), we have entered *Stage 3 (or N3) sleep*. This is the deepest stage of NREM sleep. At this time, we become much less responsive to things around us. Sleepwalking (parasomnias), sleep talking (somniloquy), and night terrors occur during N3 sleep, and it is generally difficult to wake someone from this stage of sleep. But because these stages are the deepest, they are also the most restorative. During Stage 3 sleep, our blood pressure drops, our muscles become more relaxed, our energy is restored, and tissue growth and repair occur. Growth hormones in children and young adults are also released, making this stage essential for development.

REM (rapid eye movement) sleep is a hallmark of the last stage of sleep. This sleep stage is marked by intense activity in different parts of the brain and can appear like wakefulness, even though people are temporarily paralyzed (with no voluntary motor movement). NREM sleep accounts for 75% of the time we spend sleeping at night; REM encompasses the remaining 25% (see Figure 4.9). The first REM stage usually begins 90 minutes after we fall asleep, and we enter it again every 90 minutes. Throughout the night, we move in and out of the stages of sleep, usually going from Stage 1 to Stage 2, then to Stage 3, and then back through Stages 3 and 2 again before entering REM sleep. Depending on how long we sleep, we make four or five complete cycles through the stages each night. However, unless we wake up at some point during the night, we do

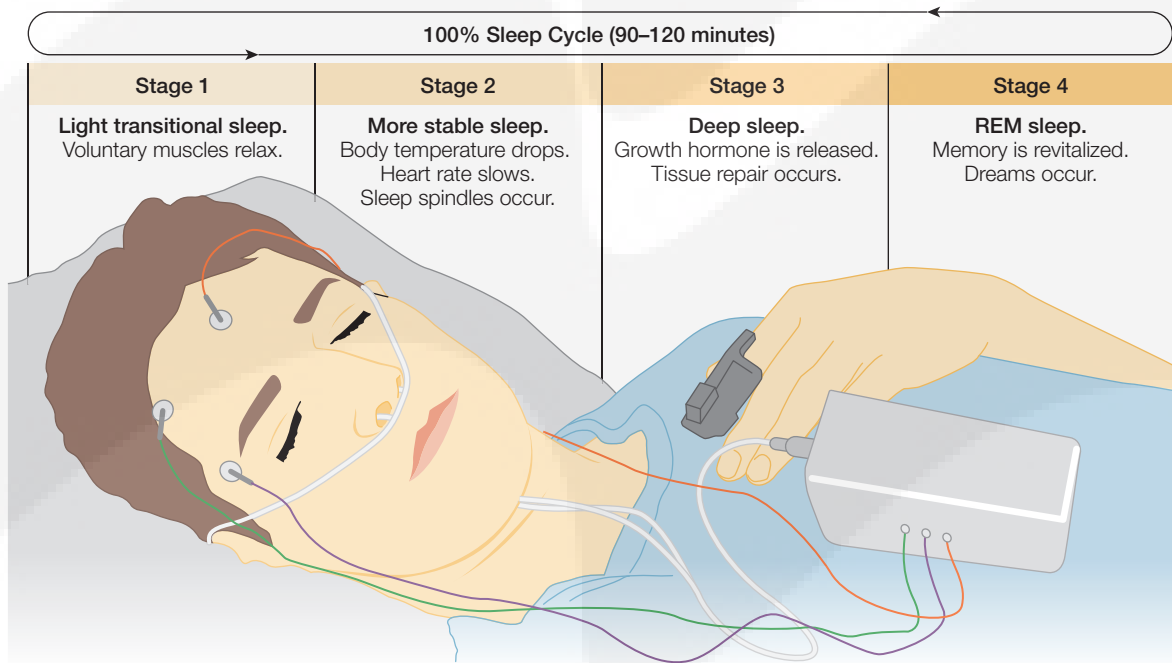


Figure 4.9: The Stages of Sleep

not re-cycle through Stage 1. The sleep cycle includes several brief periods of wakefulness intermittently throughout the night as well. With age, people spend more time awake, which can lead to feelings of fatigue during the day.

REM Sleep

As we now know, after about 70 to 90 minutes of sleep, we enter REM sleep. This stage is characterized by rapid eye movement, increased breathing, and increased brain activity. REM sleep is a paradox because, although brain activity increases significantly, our bodies actually become more relaxed, to the point of mild paralysis of voluntary muscles (like your hands, arms, or legs). The brain activity during REM sleep looks much like brain activity when we are awake, with high alpha and beta wave activity. Our breathing becomes rapid, irregular, and shallow during REM, and our heart rate and blood pressure increase.

It is during this stage that dreaming occurs. The function of dreams is still not fully understood (Schredl, 2018). They may represent neuronal connections being made and unmade, forming the basis for our thoughts, memories, mental functioning, and even emotional processing (Hartmann, 1996). REM sleep helps the nervous system develop in early life, facilitating some kinds of learning throughout the lifespan and playing a crucial role in the repair, reorganization, and formation of new connections in the brain (Hartmann, 2007).

Despite its importance, each REM cycle is rather short. The first REM cycle of the night typically lasts only 10 minutes. During the course of the night, the distribution of time spent within each stage changes so that the periods of REM sleep increase. You thus spend the most time dreaming in the early morning before you wake up, and you get the most restorative deep sleep earlier in the night, shortly after falling asleep.

Across the human lifespan, the amount of time we spend in each sleep stage changes. In later life, less time is spent in deep sleep. As a consequence of this and other age-related changes, older people wake more often during the night. Conversely, during infancy and early childhood, the percentage of time spent in REM sleep is highest. In fact, infants spend as much as 50% of their sleep in REM sleep. The percentage of REM sleep begins to decrease in adolescence and young adulthood, when only about 20% of sleep is REM sleep.

Sleep Hygiene: How Can You Improve Your Sleep?

How do you sleep? Do you have difficulty powering down after a busy day? Do you wake up during the night and have difficulty falling back asleep? Do you feel rested when you wake up? There are many ways to measure the quality of your sleep—and many ways to improve it (see Figure 4.10).

Figure 4.10: Steps to Improve Sleep



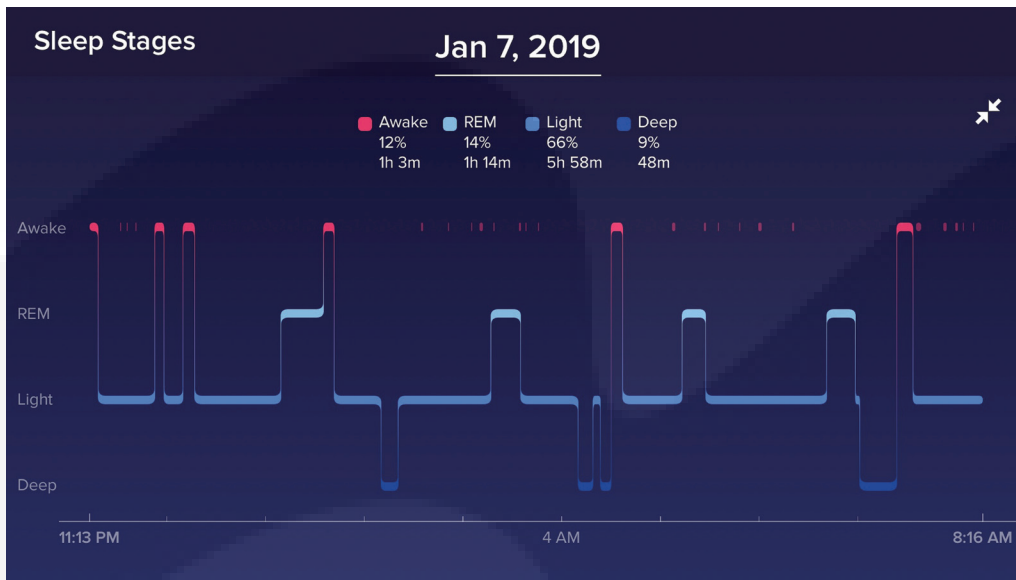


Figure 4.11: Sample Night of Sleep as Tracked by a Fitbit

Courtesy of Leslie Frazier

Many fitness-tracking devices—including our phones—now allow us to track our sleep in detail. These apps can tell us how much time we spend in each phase of sleep and can help us make our own connections between how well we’ve slept and how well we function during the day. Figure 4.11 shows the results of one night’s sleep, as tracked by a Fitbit.

With growing concerns about how our sleep is being compromised, and the negative health outcomes that can result from this, many health practitioners are advocating better **sleep hygiene**—the practices that lead to better sleep. In addition to the tips provided in Figure 4.10, the **Around the World** feature describes a unique (and contentious) practice for improving sleep hygiene for infants.

We have seen how a healthy diet, exercise, and sleep can contribute to positive health outcomes. What are some other behaviors that can improve our health? Let’s look at some important examples of preventive health care.

Thinking About Health

- Why is adequate sleep a health-enhancing behavior?
- If too much sleep is correlated with higher mortality, could the cause run the other way—with poor mental or physical health leading to too much time in bed? In light of the studies we have examined, which direction seems more likely to you?
- What can you do to improve the quality and quantity of your sleep?



AROUND the WORLD

Babies Who Chill



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For ages, parents and grandparents in Scandinavia have left their babies out in the cold—literally! In Norway, Sweden, Finland, and Denmark, it is common practice to wrap the little ones up in lots of blankets and place them in strollers outside to sleep, even in the dead of winter. A Swedish colleague reported that, in Stockholm, one often sees prams (strollers) parked outside on the sidewalk while parents socialize and enjoy a convivial lunch inside a restaurant as temperatures dip to 23 degrees F (-5°C). Even some nurseries encourage outdoor naps. In fact, most day-care centers in Sweden have outdoor naptime even when it is snowing. (Of course, if the temperatures drop too low, they cover the prams with blankets.)

This practice is believed to have taken hold in Finland in the 1920s when infant mortality rates were high (Tourula, Pölkki, & Isola, 2013). Air quality outdoors was thought to be better than indoors, and napping in fresh air was believed to prevent rickets, strengthen the blood, and offset disease. These cultural norms have endured, and now, in Norway (and elsewhere), babies are put outdoors to nap when they are as young as two weeks old.

Scandinavian parents report that napping in the cold leads to longer naps, which is beneficial for developing babies (Tourula et al., 2013). Scandinavians also believe that outdoor napping—even in the coldest temperatures—leads to happier, more energetic, and more well-adjusted children who are better able to sleep through the night and sleep under challenging conditions (Tourula, Isola, & Hassi, 2008). Parents who place their kids outdoors for naps also argue that it is healthier for them to be outside in the winter rather than indoors where germs are thriving. Regardless of the reasons why these practices have endured for generations, there is a growing body of research to support the benefits (Tourula et al., 2013; Tourula, Fukazawa, Isola, Hassi, Tochiara, & Rintamäki, 2011). However, while this practice is culturally acceptable in the Nordic countries, Scandinavian parents have been arrested in the United States for leaving their kids outside in the cold.

Question: What are the benefits of napping outdoors? What problems could arise from this practice?

Other Health-Enhancing Behaviors

Regular preventive health care and dental care are essential to good health. Although children are often required by their schools to have regular physical examinations, some adults, with no such requirements, also get annual medical exams. These adults place value on health and are willing to make efforts to preserve it. People who regularly practice this health-enhancing behavior tend to be older, more highly educated, primarily white, and of higher socioeconomic status.

Most cancers can be prevented. According to the American Cancer Society, 1,735,350 new cancer cases and 609,640 cancer deaths were projected for the United States in 2018 (Siegel, Miller, & Jemal, 2018). The good news is that these figures represent a 23% decline in overall death rates due to cancer from its peak in 1991 (American Cancer Society, 2016; Siegel, Naishadham, & Jemal, 2013). Decrease in tobacco use, better

screening, early detection and treatment, and preventive health behaviors have all contributed. Death rates due to cancer should continue to decline in the four major cancer sites—the lungs, the colon or rectum, the breasts, and the prostate (American Cancer Society, 2016).

Still, individuals can do much more to prevent and offset their risk of developing cancer (see Chapter 10 for more information on cancer). What health-enhancing behaviors are associated with cancer prevention? Furthermore, what behaviors can make everyday life activities—such as driving and sex—safer as well?



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Regular doctor visits can help catch health issues before they become dangerous.

Breast Cancer Prevention

About one of every eight American women will get breast cancer during her lifetime, making it the second leading cause of cancer in women (American Cancer Society, 2016). Many women know from their obstetrician or gynecologist about the benefits of routine breast exams. Early detection is the key.

A **mammogram** is a screening and diagnostic tool that involves a low-energy x-ray of breast tissue. Mammography has a proven track record for early detection and treatment of breast cancer. Originally, the U.S. Preventive Services Task Force recommended that women aged 40 or older should have a mammography annually, a recommendation that the American Cancer Society endorsed. In 2009, the task force revised these guidelines to state that mammograms are not needed until age 50 and then only every two years. This reflects the much greater benefits of mammography to women in their sixties, but also the psychological impact of a false-positive result and fear of unnecessary radiation exposure from early treatment. However, this revised recommendation may lead to underdiagnosis. It may cause 20% of breast cancers to go undetected (Arleo et al., 2013). More alarmingly, over 50% of these undiagnosed cancers may be *invasive*, having spread through the breast tissue.

Both the task force and its critics agree that the decision to conduct annual mammograms before age 50 should be made on an individual basis, in consultation with one's physician. It should take into account any family history of breast cancer. In the meantime, routine manual breast exams should be conducted in annual gynecology visits.

Colorectal Cancer Screening

The third most common type of cancer originates in the colon or rectum. It is also the third leading cause of death in both men and women in the United States today (American Cancer Society, 2016). Colorectal cancers often begin with the growth of a **polyp**, or non-cancerous tumor, in the inner lining of the colon or rectum. Some polyps can become malignant forms of cancer. The chance of a polyp turning from benign to malignant depends on the type of polyp and whether it is found and treated early.

According to the U.S. Preventive Services Task Force, regular screenings are advised from age 50 onward. This screening involves high-sensitivity *fecal occult blood testing* (in which stool samples are examined for the presence of blood), *sigmoidoscopy* (a test in which a lighted camera is used to examine the lining of the rectum and colon), and a **colonoscopy**. In this last test, a flexible tube called a colonoscope is threaded all the way

up the colon to examine the tissue and collect any tissue samples that look problematic. These screening tests have been found to be highly useful for early detection, but many people do not get them.

The main barriers to early detection of colorectal cancers are lack of knowledge or awareness on the part of patients, anxiety about cost or lack of insurance coverage, fear of the procedure itself, and lack of regular or current contact with a physician. Some patients report that their physicians did not inform them of the screening, and some physicians report that patients expressed anxiety and embarrassment about the procedure (Klabunde et al., 2005). Public health officials need to make more efforts to inform the general public of the benefits of screening, and alleviate any concerns or barriers.

Sun Protection and Skin Cancer

Another public health concern linked to cancer is the lack of regular sunscreen use. The primary risk factor for *all* skin cancers is sun exposure—specifically, ultraviolet radiation. In climates with a great deal of sunlight and in latitudes that have more intense sun exposure, the incidence of skin cancers is higher. Those who work or play in the sun without protecting their skin are at highest risk. Using tanning beds and lamps is also very dangerous, and there is a movement to enact strict legislation on tanning salons in the United States.

Sunscreen and sunblock are effective protections against skin cancer, but their use varies tremendously. One international meta-analysis based on 91 journal articles found that the reported use of sunscreen varies from 7% to 90% (Kasparian, McLoone, & Meiser, 2009). The same investigation also showed that only between 8% and 21% of individuals have annual clinical examinations for skin cancer. These findings show that some people are very conscientious about their skin cancer risk, while others are not.

Of all cancers, skin cancer is the most common in the United States—one in five Americans will develop it at some point in their lives (American Academy of Dermatology, 2019). Melanoma diagnoses doubled between 1982 and 2011, and 178,560 new cases were projected in 2018 (American Academy of Dermatology, 2019). The incidence is rising in young white women between the ages of 15 and 34, despite public health campaigns to educate people on the dangers of unprotected sun exposure and indoor tanning salons (Kuhrik, Seckman, Kuhrik, Ahearn, & Ercole, 2011; Quintanilla-Dieck & Bichakjian, 2019). But skin cancer does not discriminate—people of all skin colors can develop melanoma. Unfortunately, it can be harder to diagnose in those with darker skin tones because of the assumption that they are protected by melanin and because the lesions themselves may be harder to detect (American Academy of Dermatology, 2019).

There are three basic types of skin cancers. **Basal cell carcinomas** appear as raised, pink, waxy bumps that have superficial blood vessels and a slight depression in the center of the bump. They rarely metastasize. **Squamous cell carcinomas** are red, rough, or scaly, and somewhat raised skin lesions. They develop on skin that is exposed to sun, most frequently the head, neck, ears, lips, back of hands, top of feet, and forearms. Squamous cell carcinomas metastasize in 2% of cases.

The most dangerous type of skin cancer, **melanoma**, is a cancer that forms in cells that produce pigment (or melanin). Melanomas appear as black or brown skin lesions with irregular borders and coloration. They are sometimes raised, but can also be flat like freckles.

Melanomas can develop on skin that previously appeared normal or within an existing mole. Some 77% of deaths related to skin cancer are due to melanomas. They have a high fatality rate because the cancer cells break apart and spread throughout the body. Yet there is a strong chance of successful treatment if melanomas are caught early on.

The best way to tell if a freckle is cancerous is to consult a dermatologist, who can examine your skin for sun damage or precancerous skin lesions. Warning signs are a sore that does not heal, a new growth or a spread in the pigment (or color) of a spot, redness or swelling of a bump, itching or tenderness, or any change in the surface of a mole (National Council on Skin Cancer Prevention, 2016).



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The simple habit of buckling your seatbelt can save your life.

Seatbelt Use

In 2017 alone, car crashes killed 37,133 people. The good news is that this is a 2% decrease in fatalities from 2015 (National Highway Traffic Safety Administration, 2018b). The cause of these deaths is drivers' behaviors: speeding, drunk driving, running red lights, aggressive driving, fatigue, and distracted driving—that is, talking on the phone or texting while driving (National Highway Traffic Safety Administration, 2018a).

One of the easiest health-enhancing behaviors to practice is buckling up. Seatbelt use in the United States has reached an all-time high, with 89.7% of people buckling up (National Center for Statistics and Analysis, 2018), and vehicular fatalities decreasing. Still, in 2017, more than half (between 53% and 62%) of teens and adults who were killed in car accidents were not wearing their seatbelts (National Highway Traffic Safety Administration, 2018b).

Wearing a seatbelt regularly is one of the most significant behaviors that you can do to prevent death and disability. So why doesn't everyone wear their seatbelts? Here are some of the reasons people give:

- If you have airbags, you don't need to wear a seatbelt.
- Seatbelts can trap you in a fire or underwater.
- If you aren't going far, it doesn't matter.
- Being in a truck makes you safer.
- I'm a good driver, so I don't need to wear one.

These beliefs are all *false*. For example, research shows that airbags can be deadly when you do *not* have your seatbelt on. Routine trips around town and short trips on the highway are often the most dangerous. In fact, most fatal crashes happen within 25- to 40-mile-per-hour zones.

Seatbelt use is important for *all* of us, whether passengers or drivers. Seatbelts worn in trucks, SUVs, and vans save lives just as in cars, reducing the risk of fatal injury by 60%. Finally, self-confidence in driving ability is a good thing, but one needs to protect oneself from other drivers, too.

Buckle up yourself and your furry friends!



wallik/Getty Images

Safer Sex

Both men and women are capable of neglecting another important health-enhancing behavior: safer sex. Is that the same as safe sex? Not exactly.

Safe sex is the practice of using protection to prevent unintended pregnancy and exposure to **sexually transmitted infections (STIs)**. These are viral infections or diseases that are transmitted through sexual contact with an infected partner. The most common STIs are chlamydia, gonorrhea, hepatitis B virus, herpes, HIV, HPV, syphilis, and trichomoniasis. In 2017, the number of cases of chlamydia, gonorrhea, and syphilis combined was the highest ever in the United States; see Figure 4.12 (CDC, 2016c). This figure is alarming—it wasn't that long ago that syphilis had nearly been eradicated, and other forms of STIs were at historic lows.

And these rates may be underestimates because many cases go unreported and undiagnosed (CDC, 2018d). The U.S. Institute of Medicine has referred to STIs as a “hidden epidemic” with tremendous health and economic consequences (Eng & Butler, 1997). Even so, nearly 20 million new cases of STIs are diagnosed in the United States each year (Satterwhite et al., 2013). More than half are in young adults, and that proportion is rising. What's more: More than half of Americans will experience an STI at some point in their lifetimes (Koutsky, 1997).

Sex is rarely 100% safe. The only way to guarantee safe sex is to be in a relationship in which both partners are free of any STIs, neither partner has sex with anyone outside the relationship, and contraception is used to prevent unwanted pregnancy. Outside of this framework, it is best to practice safer sex.

Safer sex is sexual engagement that is respectful, pleasurable, and freely consented to by both partners, and that reduces the risk of unintended pregnancy or infections. It does *not* involve the exchange of any blood, semen, or vaginal fluids from one partner to another. Two crucial factors in safer sex are knowing if either partner is a potential carrier of an STI and maintaining open communication between partners. Communication is often the biggest obstacle to safer sex for young adults. Starting that conversation with a potential partner can be difficult, but it is necessary. Even when using condoms to protect against infection, genital warts and genital herpes can still be transmitted, because the condoms do not always cover the infected area. So, talking about safe sex is key to preventing unwanted exposure.

Chlamydia, gonorrhea, syphilis, and trichomoniasis are all easily treated when diagnosed early, but many of these infections go untreated because they often display no symptoms. They can have significant health consequences beyond themselves. If left untreated, both chlamydia and gonorrhea put women at higher risk for chronic pelvic pain and a life-threatening ectopic pregnancy. They also increase a woman's risk of becoming infertile.

Condoms cannot entirely protect against HPV, the fastest-growing STI, making communication between partners that much more important. HPV is, however, preventable. Although there are no treatments once someone has contracted the virus, young men and women can now get vaccinations before they become sexually active. The CDC and most physicians recommend the vaccine for 11- to 12-year-olds. The vaccine also reduces the risk of cervical cancers that can result from HPV. Safer sex and vaccination are thus important health-enhancing behaviors.

The State of STIs in the United States

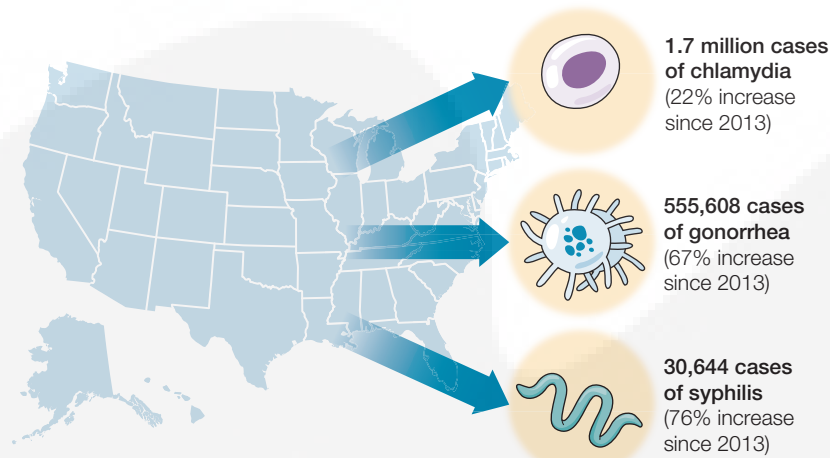


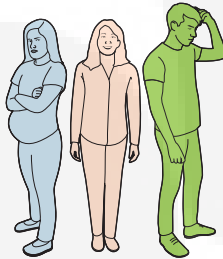
Figure 4.12: The State of STIs in the United States

Data from CDC (2018d)

Anyone who is sexually active is at risk.

Some groups are more affected:

- Young people (aged 15–24)
- Gay and bisexual men
- Pregnant women



Without treatment, STIs can cause:

- Increased risk of HIV
- Long-term pelvic or abdominal pain
- Pregnancy complications

Stop the rise of STIs.

Follow these three steps:



Talk openly about STIs with your partners and health care providers.



Get tested for STIs regularly.



Get treatment if you have an STI.

Thinking About Health

- What preventive measures do you currently take against cancer? How will the measures you take change as you age?
- How do you react to the rationales that people give for not wearing a seatbelt?
- What steps do you take to protect yourself against STIs?

Chapter Summary

Health-enhancing behaviors can significantly reduce the risk of disease and disability. Lifestyle factors, such as a healthy diet, a healthy weight, and regular exercise, ensure a higher quality of life and greater well-being for everyone. Getting adequate sleep, practicing preventive medicine, wearing sunscreen, wearing seatbelts, and practicing safer sex are all choices that can lead to a longer, healthier life.

Key Terms

- | | | |
|--|--|---|
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| Life expectancy p. 78 | External eaters p. 88 | Sleep spindles p. 98 |
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