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Chapter 8

Motivation

Each year, 198 professional bicycle racers (twenty-two teams of nine riders) from around the world participate in arguably the most arduous athletic event—the *Tour de France*. The Tour, as racers know it, consists of twenty-one daily races, or stages, covering up to 150 miles, often in mountainous terrain. Most of these racers will never win a stage, and most barely earn a livable wage racing as a professional. What keeps them going day after day suffering brutal climbs, frightening descents, and painful crashes?

On another continent in a darkened alley, a professional financier finds himself waiting for a seller who is over an hour late. He long ago lost his job with an international bank, his home in Pacific Heights, and his wife of fourteen years. Crack cocaine is his only reason to live, but he often wonders if it is worth living at all. How is it possible for someone with everything to live for to now be solely motivated by a drug?

These examples of highly motivated behavior reveal something about the role of motivation in determining our behavior. *Motivation* is a general term for the processes that influence and direct our actions. As we see in this chapter, these processes are considerably more complex than this brief definition implies; behavior is often influenced by a combination of several motivating processes, including emotions, which are the topic of the next chapter. Indeed, without emotions, motivated behavior would reflect an air of indifference. Can you imagine how boring dating would be if it were not colored by feelings of excitement, happiness, and possibly love? Similarly, think how hard it might be to become motivated to study for a test if one never experienced the angst of failure or the joy of success.

In this chapter, and Chapter 9, we examine the nature, sources, and manifestations of human motivation and emotion. We begin here by exploring motivation, some theories that try to explain motivation, and a few specific motivational processes that influence our behavior. In the following chapter, we discuss what emotions are, how they are aroused, and how they impact our lives.

8.1 The Nature of Motivation

A war veteran attracts national media attention by housing himself inside a cage and refusing to eat. A college graduate with great promise for an academic career gives up everything to work as a missionary under extremely impoverished conditions in a poor, underdeveloped country. An athlete commits several hours a day to training even under adverse weather conditions. A distraught employee bursts into his employer's office firing a gun. You might ask the same question about each of these accounts: Why would someone do such a thing?

This question raises the issue of motivation, the *why* of behavior. In a sense, the entire study of psychology is concerned with the underlying causes of behavior, so you will see motivational concepts permeate every chapter in this text. Thus far, we have explored the biological foundations of behavior and the role that sensation, perception, and learning play in determining our actions. Here we will expand on how these factors contribute to motivational states. Often, changes in motivation explain the variations and inconsistencies in behavior when these variations cannot be attributed to differences in ability, training, or environmental conditions.

Beside explaining these variations, motivational concepts help to explain the distinction between learning and performance. Learning does not always lead directly to behavior. Recall from Chapter 6 the latent-learning experiment discussed, in which rats learned how to move through a complex maze but did not demonstrate this behavior until they were motivated by food. In a similar vein, if you learn to imitate the voice of Chris Rock, you probably will not use this voice to communicate with your dog, your professors, or your parents; you are likely to express this behavior only when you have an appreciative audience. Motivation is what often translates learning into overt behavior.

8.1a Defining Motivation

Motivation A condition or state that energizes and directs an organism's actions

Motivation can include physiological factors, such as the body signals that tell us we are hungry, thirsty, or tired; however, there is more to motivation than the simple translation of body needs into action. Motivation may also include cognitive contributions such as a desire to achieve, the expected outcomes of our actions, or an urge to be with friends. In fact, **motivation** can be defined as any condition that energizes and directs our actions.

To illustrate, suppose you are reading this chapter late at night and are becoming increasingly aware of a familiar urge. Finally, you close your book and decide to do something about your intensifying hunger. It is time to get something to eat, but will any old food satisfy you? Not likely when the best pizzeria in town is only a few blocks away. So off you go into the night in mouthwatering anticipation of your favorite pizza.

This example of one of the most familiar motives, hunger, illustrates that motivation not only energizes or *activates* us to behave in a certain way but also *directs* or defines the direction of the resulting behavior. Motivation also has a direct impact on how *vigorous* or intense our behaviors are. If you had skipped dinner earlier in the evening, your trip to the pizzeria might be characterized by brisk walking rather than a leisurely stroll and you might consume all of it rather than saving one or two pieces for your roommate. Motivation is also a factor in your decision to eat pizza, not McDonald's, which was a block closer.

In all, we might say that motivation is the "why" of behavior, while physiology, learning, sensation, and perception help to explain how we behave. As we see in the following discussion, why people do what they do has not been easy to answer, and a complete answer will necessarily include several motivational influences.

8.2 Motivational Explanations of Behavior

Since its beginnings, psychology has attempted to conceptualize and explain behavior in terms of motivation. These explanations have not all been equally successful. Yet each of the approaches we consider here—instinct theory, cognitive motivation, biological motives, and sensation-seeking motivation—help contribute to our understanding of human and animal behavior.

Whether we attribute behavior to inherited behavior patterns, to the need to reduce drives, to learned expectations, or to biological states, it seems clear that no one theory explains all aspects of motivation. Certain behaviors, such as drinking a glass of water after exercising, might be explained predominantly by the reduction of a biological need. Other behaviors, such as continuing the habit of smoking despite the fact that it makes you cough or devoting four years to earning a college degree, have more complex explanations. It seems, then, that to understand behavior we must first determine what types of motivation are in question. In general, it is useful to classify motivation under several categories: innate or genetically determined motives, the reduction of drives, cognitive motives, biologically based motives, and sensation-seeking motives.

8.2a Instinct Theory

One of the earliest attempts to account for motivation was based on the notion of **instincts**, innate patterns of behavior that occur in every normally functioning member of a species under certain, set conditions. For example, a salmon may swim thousands of miles through ocean waters and up a river system to reach the exact spot in a gravel bed where it was spawned several years earlier. Likewise, an arctic tern, hatched in the northland, will depart for the southernmost portion of South America when the arctic days grow shorter. Such behaviors occur in virtually identical fashion among all members of a species, generation after generation.

Instincts Innate patterns of behavior that occur in every normally functioning member of a species under certain set conditions

The attempt to explain human behavior in terms of instincts was the dominant force in psychology in the late 1800s and the early 1900s, due in large part to Charles Darwin's emphasis on the similarity between humans and other animals. William James (1890), a highly influential early psychologist, argued that humans are even more influenced by instincts than are lower animals because they are motivated not only by biological instincts but also by a variety of psychosocial instincts such as jealousy, sympathy, and sociability. James proposed a list of fifteen instincts, which he suggested account for much of human behavior. Other psychologists have suggested their own lists. Predictably, by the early 1920s, almost fifteen thousand instincts had been proposed to account for virtually every kind of human behavior imaginable.

Fifteen Instincts Proposed by William James That Account for Much of Human Behavior

1.	Cleanliness	6.	Jealousy	11.	Rivalry
2.	Constructiveness	7.	Modesty	12.	Secretiveness
3.	Curiosity	8.	Parental love	13.	Shyness
4.	Fearfulness	9.	Playfulness	14.	Sociability
5.	Hunting	10.	Pugnacity	15.	Sympathy

Adapted from *The Principles of Psychology* by William James (1890).

Psychologists realized that there was a basic flaw to instinct theory. Instincts did not explain behavior—they simply provided another way of labeling it. Today, psychologists do not totally discount the idea that there are inborn or inherited factors in human behavior. In fact, the concept that genetic factors influence our behaviors is very much alive. Behaviors considered by some to be under the influence of genetics include your selection of a potential mate, personality traits, intelligence, and even your susceptibility to addiction and to severe behavioral disorders. However, since our behaviors are so profoundly influenced by learning, it is essentially impossible to find one example of human behavior that fits the literal definition of instincts as proposed by the early psychologists. At present, psychologists are interested in determining the extent to which our genes influence certain aspects of our behavior.

8.2b Drive-Reduction Theory

Just as instinct theory reflected the late nineteenth century interest in Darwin's evolutionary theory, a second explanation of motivation fits well with early behavior theory. According to the *drive-reduction theory*, motivation originates with a need or drive (such as hunger or thirst) that is experienced as an unpleasant, aversive condition. This internal need motivates us to act in a way that will reduce the aversive condition. For instance, if we feel thirsty, we find something to drink; if we feel hungry, we seek food.

The drive-reduction theory explains motivation in these terms. According to this viewpoint, proposed by Clark Hull (1943), drives are any unpleasant internal conditions that motivate an organism to engage in behaviors that reduce this unpleasant state of tension. Hull postulated that there are two kinds of drives. *Primary drives* are induced by internal biological needs, such as water or food deprivation, and they do not depend on learning. In contrast, *secondary* or *acquired drives* are derived from experience.

The concept of acquired drives is directly linked with the ideas of Pavlovian conditioning, discussed in Chapter 6. Any neutral stimulus, for example, associated with a painful or frightening experience can come to elicit a similar emotional state. If you had a car accident while driving on icy roads, seeing ice may motivate you to avoid driving a particular stretch of road where the accident occurred. Avoidance of people, places, and activities may serve to reduce an aversive emotional state. While the drive-reduction theory seems to explain some motivation, it does not explain all motivation. A major problem with the drive-reduction approach is that many behaviors don't appear to reduce any primary or conditioned drive. For example, many people enjoy working out. Does this mean there is an exercise drive that is reduced by weightlifting, running, or cycling?

Another difficulty with the drive-reduction theory is that sometimes stimuli in our environments can energize or motivate us to behave in a certain way in the absence of an internal drive state. For instance, have you ever found yourself sampling homebaked cookies because they smell so good, even though you are not at all hungry? A number of studies have demonstrated that external stimuli, which psychologists call **incentives**, can motivate behavior even when no internal drive state exists. In one experiment, for instance, it was shown that a substance such as saccharin, which has no food value and does not satisfy hunger, reinforces behavior and motivates subsequent performance of animals just because it tastes good (Sheffield, 1966). In a related experiment, Sheffield demonstrated that rats could learn a response that led to the initiation of copulatory behavior, even when copulation was interrupted before completion (Sheffield, et al., 1951). These results suggest that behavior can be maintained by conditions that increase drive or arousal.

Incentive Any external stimulus that can motivate behavior even when no internal drive state exists

Still another problem with the drive-reduction theory has to do with the fact that many motivated behaviors do not decrease as they are expressed. According to the drive-reduction hypothesis, an internal need directs us to a goal, and reaching that goal reduces the tension of the drive. It follows, then, that when the drive is reduced, the motivated behavior should cease. However, sometimes a motivated behavior seems to be self-perpetuating. An example is the desire to explore our environments. When humans and other animals have the opportunity to explore their surroundings, these reinforcing experiences often motivate further exploration rather than less. Similarly, other motives, such as the need to achieve and the need for power, typically continue to grow and expand as they are expressed rather than diminish, as drive theory would predict.

For these and other reasons, the drive-reduction theory is inadequate to explain the wide range of human and animal behaviors we observe. Drive theories have, however, had an influence on our casual explanations of behavior. For instance, it is quite common to describe the emotion of anger as building up or for one to be filled with jealousy or with stress. Behaviors associated with these emotions are often explained in terms of a reduction in their corresponding drive state. Just because these are commonly accepted explanations for these actions, however, does not mean that drive theory is correct. In fact, drive theories have largely been replaced by more modern biological approaches.

8.2c Cognitive Theories of Motivation

The cognitive perspective offers an alternative explanation of motivation. According to this view, our cognitions, expectancies, beliefs, and other mental processes play an important role in motivating our actions. This view is exemplified by the role of expectations in both classical and operant conditioning. Recall from Chapter 6 that the cognitive viewpoint sees expectations as important in both Pavlovian conditioned responses and operant behavior. For example, when we study for an exam (an operant behavior), a consequence occurs (hopefully a good grade) that serves as a reinforcer. We form an association between the behavior and the reinforcement that follows. This association then generates an *expectation* that if the behavior is repeated, it will again produce positive consequences. These cognitive expectancies can also be learned by observation. For instance, as we saw in Chapter 6, if a child watches another behave aggressively with satisfactory consequences the child may come to expect positive consequences from aggressive behavior (Bandura, 1973).

During the 1930s and 1940s, Edward Tolman, and later Julian Rotter (1950s and 1960s), had championed the idea that expectations were important motivators. Both Tolman and Rotter maintained that our likelihood of engaging in a given behavior depends on two factors: that our expectations of a certain behavior will lead to a desired goal, and the value and location of that goal. According to Tolman, animals don't learn specific stimulus-response associations; they learn which behaviors lead to which goals. Thus, the likelihood that you will gather your courage and ask that alluring person you just met for a date is determined to some degree by your past experiences in asking people out. If your last several overtures have all resulted in rejection, you are less likely to try again because your cognitive expectation is rejection. However, you may overcome your expectations of failure if you try another approach. Rescorla (1999, 2007) has demonstrated how cognitive expectancies enter into our associations. What Rescorla proposes is that in addition to stimulus-stimulus (CS-UCS) associations, organisms also learn response-outcome associations during Pavlovian conditioning. These response-outcome associations are essentially learned expectancies that a certain behavior leads to a specific outcome.

Achievement Motivation

Need for Achievement (nAch) Complex psychosocial motive to accomplish difficult goals, attain high standards, surpass the achievements of others, and increase self-regard by succeeding in exercising talent

If you are the kind of person who is not content unless you make top grades, and who is committed to being highly successful in your chosen career, psychologists would say that you have a high **need for achievement (nAch)**. The concept of achievement motivation was first defined in 1938 by Henry Murray as the need to "accomplish something difficult, to overcome obstacles and attain a high standard, to rival and surpass others, to increase self-regard by the successful exercise of talent" (p. 164). Murray developed the *Thematic Apperception Test (TAT)* to measure the need for achievement and other human motives. Not until the 1950s, however, was the TAT refined (McClelland, 1953) as a tool for assessing the need for achievement. The TAT asks people to make up stories about a series of ambiguous pictures. The idea is that people will project into the stories their own motives, interests, and values.

A number of studies show that people who score high in need for achievement differ notably from those with moderate or low nAch scores (Senko et al., 2008). Below is a summary of some of the traits that characterize people who have a high need for achievement.

Characteristics of High Need-for-Achievement (nAch) Individuals

- Optimistic about personal prospects for success; feel personally in control of their destinies and willing to delay gratification for the sake of achieving long-term goals (for example, willingness to extend education into postgraduate studies rather than going for the immediate economic rewards of a lesser job)
- Tend to seek higher levels of socioeconomic success than parents and are more often successful in achieving this than people with low nAch scores
- Inclined to set realistic career goals that are neither too easy nor too difficult for their skills, whereas low nAch scorers tend to select career goals that are either too easy or unrealistic in light of their abilities
- Attain higher grades in academic courses related to career goals than do low-need achievers
- Tend to be relatively independent and more concerned with succeeding on tasks than with how they affect other people

Since the achievement need is a cognitive motivation, it is highly influenced by learning and experience. Indeed, ample evidence demonstrates that the way in which we raise our children may significantly influence their need to achieve (McClelland & Pilon, 1983). One way to help instill a desire to achieve is to encourage children to set reasonable goals and to provide ample reinforcements for their successes. Being realistic about goals is especially important because they are more likely to be achieved, thus allowing children to experience success and develop cognitive expectancies for success in other situations.

Of equal importance is fostering independence. In one study, Marion Winterbottom (1958) found that children who demonstrated high achievement motivation usually had parents who expected them to master their own environments and to show independent behavior (by doing things such as earning their own spending money) well before their teenage years. Little things like expecting a child to pick out what he or she is going to wear to school or letting children have a vote in certain family decisions may encourage a sense of independence and motivate them to achieve success.

Cognitive Dissonance

What happens when our **cognitive expectancies** of a situation differ from the actual outcome? For example, what if we study hard for an exam expecting to earn an *A* and we actually receive a *C*? Does the discrepancy between expectancies and outcomes influence our behavior? In the next section we look at a theory of motivation that is based on these discrepancies.

Cognitive Expectancy A learned expectancy of relationships between stimuli (in Pavlovian conditioning) and between responses and outcomes (in operant conditioning)

Cognitive Dissonance Theory Theory that people experience psychological discomfort or dissonance whenever two related cognitions or behaviors are in conflict

Cognitive dissonance theory emphasizes the idea that we behave in ways to minimize inconsistencies in our beliefs, attitudes, opinions, and behaviors (Festinger, 1957). According to this theory, cognitions about one's self and the world around us can be either consistent or inconsistent. When cognitions are inconsistent, a negative motivational state results, which activates us to resolve the inconsistency. For example, suppose that you know you should continue studying this chapter for an exam tomorrow, but you also promised a friend you would go to the game. Because these two thoughts are inconsistent (because you can't do both), cognitive dissonance is generated. Cognitive dissonance motivates other thoughts or behaviors to resolve this inconsistency. For instance, you may resolve this either by generating a new belief that you already know the material well enough to pass the exam (so you might as well go to the game); or, dissonance could be resolved by changing your belief about the importance of keeping your promise (and calling off plans to go to the game). How could the dissonance that was created by getting a *C* on that exam be resolved? A common resolution would be to generate the belief that the exam wasn't a fair test of your knowledge. After all, if the exam were unfair, no amount of studying would have prepared you.

Cognitive dissonance may also occur as a result of inconsistencies between your behavior and your beliefs, particularly when your behavior can be justified. Suppose you hold the belief that cheating on exams is wrong, but find yourself cheating. This inconsistency will generate considerable dissonance unless the cheating can be justified by a new belief that the professor's exams aren't really fair anyway. In both of these examples, dissonance is decreased by a change in beliefs.

Dissonance theory has generated considerable research over the years. In an early test of dissonance theory, Aronson and Mills (1959) asked for female volunteers to participate in a series of discussions about sex. Before participation, however, the subjects had to pass a "test" to determine whether they were indeed capable of handling the discussion material. At this point the subjects were divided into two groups. For the first group the "test" consisted of reading aloud sex-related words and descriptions of sexual behavior in the presence of a male experimenter. The "test" for the second group consisted of reading aloud only mildly descriptive sexual material. After completing the "test," the subjects from both groups were allowed to listen to a boring tape recording of discussions of sexual behavior in animals. As a test for cognitive dissonance, the subjects were then asked to rate the discussion and their willingness to participate again. Before reading on, consider which group of females had the greatest cognitive dissonance and how this might have influenced their rating of the discussion and their willingness to participate again.

Dissonance theory predicts that the subjects in the first group should have the greatest dissonance because of the discrepancy between their "test" (reading aloud sexually explicit material) and the boring nature of the discussions. To resolve this inconsistency, these subjects should rate the discussions as more interesting as well as be more willing to participate in future discussions than the second group. The results of this experiment confirmed these predictions.

More recently, researchers examined the role of cognitive dissonance in maintaining smoking in a group of 244 adolescent smokers. Smoking causes dissonance because smokers are aware that their habit is unhealthy and often leads to smoking-related disease and a shortened lifespan. One way to resolve this dissonance, according to the researchers, is to develop a compensatory health belief that engaging in other healthful behaviors can offset the risks of smoking. The researchers found that smokers who were not prepared to quit smoking engaged in more compensatory beliefs than those who were motivated to quit (Radtke et al., 2011).

Dissonance theory has been supported in a wide range of experiments designed to create cognitive dissonance. Overall, experiments tend to support Festinger's assumption that subjects tend to reduce cognitive dissonance by either making a change in their behavior, or more likely, a change in their attitude to achieve consistency (Harmon-Jones & Harmon-Jones, 2008; Olsen & Stone, 2005).

As we have seen, our behaviors may be energized and directed by a variety of complex cognitive motives that seem to demonstrate little or no relationship to biological needs. These motives are determined by learning, and they are aroused and satisfied by cognitive and social events rather than body tissue needs. Unlike the biological motives we discuss next, these motives do not need to be satisfied to ensure survival. However, much of human happiness and misery is associated with the satisfaction or thwarting of these important cognitive motives.

8.2d Biological Bases of Motivation

Biologically based motives are rooted primarily in body tissue needs, such as those for food, water, air, sex, sleep, temperature regulation, and the avoidance of pain. Psychologists generally use the term **drive** to refer to motives that are based on tissue needs. In both humans and other animals, basic biological drives such as hunger and thirst must be satisfied in order to ensure survival. (Recall that Clark Hull made a distinction between primary or biological drives and secondary or learned drives.)

While the underlying needs behind biological drives are inborn, the expression of these drives is often learned. For example, a hungry person is motivated by a state of physiological food deprivation. Consequently, that person learns how to search the environment effectively for food that will satisfy this basic need.

Biologically Based Motives Motives such as hunger and thirst that are rooted primarily in body tissue needs; sometimes referred to as *drives*

Drive Commonly used to describe motives that are based on tissue needs, such as hunger and thirst

Hunger and Eating

What processes let us know we are hungry, and how do we know when we have eaten enough? Researchers have tried to answer these seemingly basic questions since the beginning of this century. In spite of extensive research, however, we are still a long way from a complete understanding of this extremely complicated biological drive. The following discussion examines what we have learned about many of the factors that influence hunger and eating; it also considers obesity and other eating disorders.

Hunger performs a critical biological function. It tells us when our bodies require more nutrition. What are the mechanisms that tell us we are hungry? Although the obvious answer to this question is that our empty stomachs tell us, the picture is actually much more complicated. Attempts to explain the possible biological bases of hunger have focused on a number of areas, including the stomach, monitoring mechanisms in the brain, and other body organs such as the liver. We consider the evidence in each of these areas of investigation.

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Despite extensive research, the extremely complicated biological drive of hunger is not fully understood.

The Stomach We have all experienced hunger pangs and growling stomachs when we have not eaten for some time. We are also familiar with the feeling of a full stomach when we have completed a meal. From our own experience, then, it seems logical that the contractions of an empty stomach are what make us hungry and that the pressure of food against the stomach walls tells us to stop eating. Do you believe that stomach contractions motivate you to eat and a sensation of fullness motivates you to stop? Think about this for a moment before reading on.

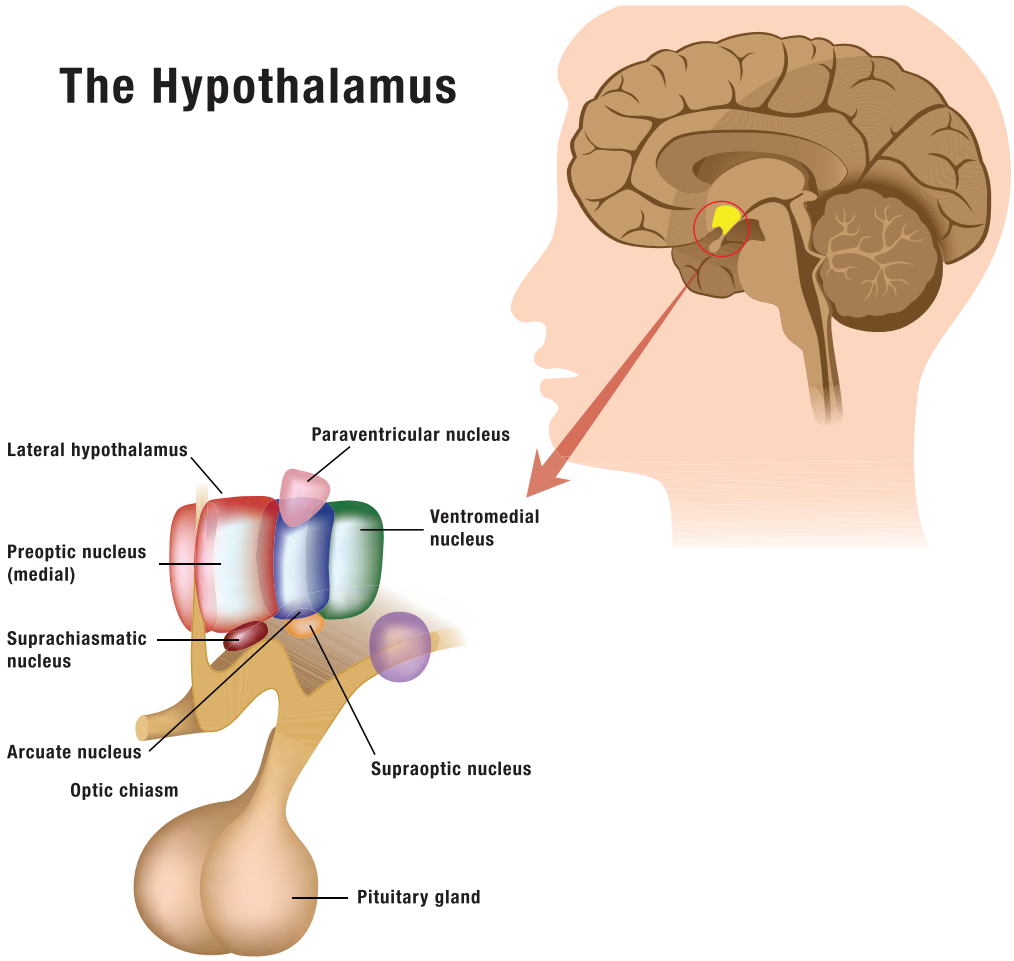
While people do associate hunger with an empty stomach, cancer patients who have had their stomachs removed still experience hunger, and experimental animals will stop eating a meal even when food is removed from the stomach as soon as it arrives. Despite this evidence, however, most hunger researchers believe that stomach sensations do contribute to our overall feelings of hunger and satiety (fullness). For example, strong evidence suggests that the stomach contains pressure detectors that are activated when the stomach is distended with food and/or fluids. These sensors seem to play a role in signaling satiety and thus inhibiting further eating. Nevertheless, research has made it clear that stomach contractions are not necessary for hunger and that we must look outside of the stomach for a complete explanation. One primary line of research has focused on the hypothalamus.

The Hypothalamus

It has long been suspected that the hypothalamus is somehow involved in hunger motivation. A number of early studies identified two specific regions within the hypothalamus that appeared to serve as control centers for eating. One is the **ventromedial hypothalamus (VMH)**, located in the front center portion of this brain structure (see Figure 8–1). When the VMH is electrically or chemically stimulated, feeding behavior in animals is inhibited. Conversely, when the VMH is destroyed, the result in many species is extreme overeating and obesity, a condition called *hyperphagia*. These findings suggested that the VMH served as a satiety center that inhibited eating by somehow signaling an organism when it has had enough to eat.

Ventromedial Hypothalamus (VMH) A region of the hypothalamus in which damage results in faster gastric emptying and an increase in insulin production; also important for female sexual behavior

Figure 8–1 A Drawing of the Hypothalamus Showing the Location of the Ventromedial, Arcuate, and Lateral Nuclei



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Just as the VMH seemed to act as an "off switch" to inhibit eating, another structure in the hypothalamus seemed to act as an "on switch" or feeding center. Damage to the **lateral hypothalamus (LH)**, an area on the sides of the hypothalamus, produced just the opposite effect of lesioning the VMH. When the LH is destroyed, animals dramatically reduce food consumption or stop eating altogether, a condition known as *aphagia*. Conversely, electrical or chemical stimulation of the LH feeding center caused animals to eat—even if they are already satiated (Stellar, 1954). The experiments suggested that structures in the hypothalamus operate together to maintain a relatively constant state of satiety, much as a thermostat maintains a constant temperature in a house. The VMH and LH centers monitor the status of our bodies' energy resources.

Lateral Hypothalamus (LH)
An area of the hypothalamus that is important for taste sensation, mediating digestive processes, and salivation

We must be cautious, however, in interpreting these hypothalamic areas as simple feeding and satiety on/off centers. More recent research has revealed that these regions receive signals from several important hormones and neurotransmitters that appear to be critical for feeding motivation. Lesions to the VMH may actually lead to the secretion of large amounts of insulin, resulting in lowered blood glucose levels and thus an increase in hunger. Additionally, VMH lesions appeared to have impacted the nearby **arcuate nucleus** (Figure 8–1), which controls the secretion of several important neurotransmitters, including **neuropeptide Y (NPY)**. Neuropeptide Y is a potent stimulator of appetite as well as a regulator of insulin secretion. Animals with VMH lesions appear to gain weight because of an increase in NPY and insulin secretion. An increase in insulin secretion results in all available fuel being converted into fat. These animals, therefore, are motivated to eat because they are chronically hungry. In addition, not all of the reduction in feeding observed after LH lesions can be attributed to a decrease in motivation. Rather, much of the decrease has to do with damage to nearby neural pathways involved in integrating the sensations of taste, smell, and the sight of food (Rolls & Baylis, 1994). In summary, while the hypothalamus is clearly involved in feeding motivation, specific neural centers do not function as simple on/off switches. Rather, the hypothalamus is responsible for regulating the secretion of neurotransmitters and hormones necessary for the initiation of feeding, glucose storage and release, and integration of sensory and metabolic information regarding the status of fuel reserves (Carlson, 2014).

Blood Glucose and Hunger

While research on the hypothalamus clearly reveals that it plays a vital role in feeding motivation, it still leaves questions unanswered. What internal bodily changes does the hypothalamus integrate to trigger hunger and to regulate how much we eat? What are the chemical and hormonal signals for hunger? To answer these questions, we need to know what internal biological conditions the hypothalamus monitors. One such variable that is affected by feeding and satiety is blood glucose. Because one of the most important body fuels is glucose, it seems logical that hunger might occur as time passes since our last meal and levels of glucose in our blood become lower.

The **glucostatic hypothesis** suggests that levels of glucose are monitored by *glucoreceptors* (cells sensitive to glucose in the bloodstream). Another substance, *insulin* (a hormone secreted by the pancreas), is also monitored, for insulin must be present in order for glucose to be used by cells. Hunger results whenever the glucoreceptors detect that glucose is unavailable, either because of low blood sugar levels or because there is not enough insulin present to enable cells to use the glucose in the bloodstream. Support for this theory was provided by evidence that insulin injections and other treatments that lower blood sugar levels have the effect of stimulating hunger, leading to eating (Epstein & Teitelbaum, 1967). We now know that detectors in both the liver and the brain monitor the rate of glucose utilization. The assumption is that while the decision to eat is made in the brain, signals from the liver convey essential information about glucose metabolism. This information about glucose is translated by the hypothalamus into increases in cell activity and the release of additional hormones and neurotransmitters (Melnick et al., 2011).

Arcuate Nucleus An area of the hypothalamus, adjacent to the ventromedial nucleus, that regulates the secretion of neuropeptide Y and insulin

Neuropeptide Y (NPY) A potent stimulator of appetite and a regulator of insulin secretion

Glucostatic Hypothesis Theory that hunger results when glucoreceptors detect a lack of glucose, either because blood levels of glucose are low or because insulin is not available in sufficient quantity

8.2e Hormones Controlling Hunger

Research also suggests that there are several hormones involved in feeding regulation. There is especially strong evidence linking the hormone **cholecystokinin** (**CCK**) to appetite suppression (Dourish et al., 1989; Garlicki et al., 1990). CCK is released when food enters the duodenum; it then seems to travel through the bloodstream to the brain, where it acts to inhibit eating behavior. In one study, investigators found that brain levels of this hormone were significantly lower in obese rats than in normal rats, suggesting that the overweight rats consumed excessive food because their CCK levels were not sufficient to suppress their eating behavior (Straus & Yalow, 1979). Furthermore, animals that lack sensitivity to CCK (through a genetic manipulation) eat excessively and become obese (Zhu et al., 2012). An alternative mechanism for CCK action that is consistent with other results may be that CCK disrupts the sensory signals for taste, thereby making food less palatable (Ettinger et al., 1986). As you know from experience, taste changes as you eat a large meal. This is why meals often begin with bitter salads and finish with highly palatable and sweet desserts. As we eat, CCK is released and foods become less and less palatable.

Other neurotransmitters and hormones that have been implicated in feeding include neuropeptide Y, which was discussed above, and **leptin**. An injection of neuropeptide Y, which may be the most powerful stimulant to feeding we know of, into the hypothalamus of animals results in voracious eating, even if animals just completed a large meal. Another hormone, leptin appears to signal satiety. Leptin is secreted by fat cells and counters the effects of neuropeptide Y in the arcuate nucleus of the hypothalamus. Injections of leptin have been shown to inhibit eating and to increase metabolic rate (Baskin et al., 1999). Other hormones beside neuropeptide Y and leptin are certainly involved in eating, and some are presently under investigation for their potential in treating a variety of eating disorders. One thing, however, is very clear from several decades of research on feeding motivation: *There is no single physiological state or hormone that signals hunger or satiety.* Likewise, there will not be an easy cure for obesity in humans. It is becoming increasingly clear that leptin, neuropeptide Y, and several other hormones regulate energy balance and the motivation to eat through a system of neural circuits throughout the arcuate, lateral, and ventromedial nuclei of the hypothalamus (Klockars et al., 2019).

Cholecystokinin (CCK) A hormone that regulates the rate of food digestion and decreases appetite by affecting neurons in the hypothalamus

Leptin A hormone that is produced by fat cells and appears to signal satiety to neurons in the hypothalamus

So far, we have been exploring the control of hunger and eating and the mechanisms that motivate daily food intake. In addition, there must also be both short-term and long-term control mechanisms that allow most of us to maintain our weight at a relatively constant level over time. The integration of blood glucose levels, CCK, neuropeptide Y, and leptin activity all play a crucial role in eating motivation. The outcome of this integration is a decision to eat or not to eat (Toates, 2001). Although some people seem to be perpetually losing and regaining the same 10 or 20 pounds, most animals, including people, maintain a relatively constant weight that may fluctuate by only a few pounds over the long term. This is evidence that the integration of multiple chemical, behavioral, and environmental factors works remarkably well.

8.3 Eating Disorders: Obesity, Anorexia, and Bulimia

8.3a Obesity

Obesity Condition in which an individual weighs 20 percent or more above the desirable weight for his or her height

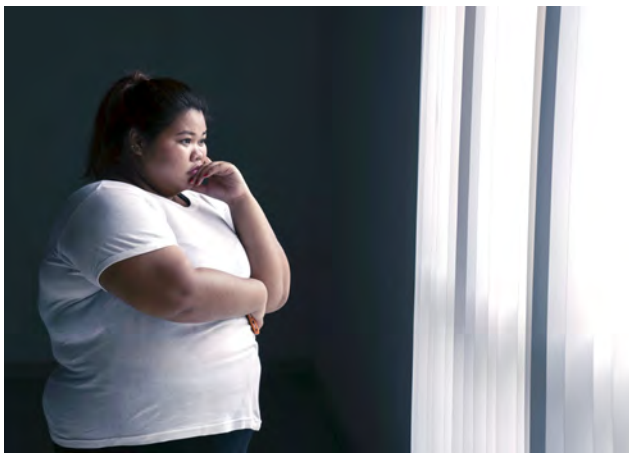
We are a nation that seems obsessed both by food and losing weight. Television commercials besiege us with images of beautiful bodies and athletic-looking people engaging in energetic aerobic exercises. At the same time, we see ads for ice cream, doughnuts, double cheeseburgers, and pepperoni pizza. How many people do you know who are on a diet? Perhaps you are one. According to recent estimates, about 70 percent of adult Americans are overweight and 43 percent are **obese**, weighing 20 percent or more above the desirable weight for their height (Centers for Disease Control and Prevention, 2021d). In addition, 19.3 percent of children are now considered obese (Centers for Disease Control and Prevention, 2021a). The economic impact of obesity in the United States is also staggering. It is estimated to cost well over $1.3 trillion each year in direct and indirect medical expenses as well as in loss of productivity (Lopez et al., 2020). Most health professionals agree that obesity places a person at greater risk of developing one or more health problems. Obesity greatly increases the risk of high blood pressure, stroke, heart disease, diabetes, cancer, gall bladder disease, respiratory problems, and arthritis (Centers for Disease Control and Prevention, 2020).

People try to get rid of excess weight by starving or sweating it off, but the grim fact is that in most cases, fat wins. This is not to say that people cannot lose weight. Quite the contrary, many people lose and regain the same 10 or 20 pounds over and over again. Studies demonstrate that of those people who go on fad diets, approximately 95 percent regain all of their lost weight within one year (Cleveland Clinic, 2019).

Theories of Obesity

There are many theories about why people become overweight. Blame has been placed on genes, conditions of early development, metabolic factors, and learned responses to emotional stress. We briefly consider the evidence for each of these viewpoints.

Genetic Causes of Obesity Several studies have demonstrated that a child whose parents are both of normal weight has less than one chance in ten of becoming obese. When one or both parents are overweight, however, the odds jump to approximately two out of five and four out of five, respectively. Of course, just because obesity runs in families is no proof that a genetic predisposition is involved. An equally logical explanation is that obese parents overfeed their children as well as themselves, thereby establishing a habit of excessive eating.



(Shutterstock)

A number of studies link obesity with negative body image and depression.

To control for these environmental factors, researchers have compared the concordance rate of obesity in identical twins that have the same genes with that of fraternal twins who do not share the same genes. Specifically, *concordance* refers to the degree of agreement in the expression of a given trait in both members of a twin pair. Concordance is usually expressed as a correlation coefficient. Investigators have also compared the weight correlations between adopted individuals and their biological parents with correlations between the weights of adopted individuals and their nonbiological, adopting parents. Data from both of these kinds of studies have led obesity researchers to conclude that genetic influences have an important role in determining human obesity (Archer et al., 2019; Pérusse et al., 2005; Yeo, 2012). However, genetics is not the only factor contributing to obesity.

Early Childhood Experience It has been found that the fat cells of obese people are as much as 50 to 100 percent larger than those of lean people. In addition, obese people often have a greater number of fat cells. Many researchers believe that eating patterns during childhood and adolescence strongly influence the size and number of fat cells in the body of an adult, and this theory has been supported by research. There is ample evidence that obesity among children is increasing at an alarming rate and that childhood obesity is associated with an increased risk of adult obesity (Ebbeling & Ludwig, 2008; Ferraro et al., 2003; Gill et al., 2018).

Metabolic Factors Metabolic disturbances, also called *metabolic syndrome*, have often been blamed for obesity. Some people do seem to convert food into body tissue, primarily fat, at a faster rate than others, and they are likely to have trouble maintaining a desirable weight. Certainly variations in insulin secretion, as well as other hormones, can lead to obesity in humans.

Reactions to Emotional Stress Many of us have a tendency to overeat when we are under stress. Campus cafeterias and local pizzerias seem to do a lot of business just before and during finals week. Some people who are chronically stressed, depressed, or anxiety-ridden tend to overeat as a matter of course. This tendency may be due to a number of factors.

One possible cause is experience. Unfortunately, some parents reinforce their children's good behavior with high-calorie goodies such as cookies or cake. This kind of experience helps a child learn to associate eating with feeling good, and food may also take on the symbolic meaning of love and acceptance. Again, parents often praise their children for eating lots of food—another experience that strengthens the association between food and feeling good. Later in life, these early experiences may show up as craving food whenever a person feels rejected, depressed, disappointed, or unhappy. Certain foods, particularly those high in carbohydrates, produce a calming or sedative effect by altering levels of neurotransmitters. As we mentioned in Chapter 3, foods high in carbohydrates indirectly increase levels of serotonin in the brain, which may alleviate symptoms of depression. Thus, eating may be spurred by the desire to reduce unpleasant emotional states (that is, negative reinforcement).

Another factor that may contribute to overeating is the tendency to eat during emotional stress. A recent study examined the relationship between perceived stress and the drive to eat in 457 women. Those who reported greater stress had a significantly greater drive to eat. They also experienced an inability to inhibit eating, greater bouts of binge eating, increased hunger, and a decreased ability to restrain from eating (Cuevas et al., 2019; Groesz et al., 2012).

Obesity is clearly a significant problem for a large number of individuals. Each year in the United States alone, millions of dollars are spent annually by people trying to lose weight through diet and exercise programs. While the review of causes of obesity presented here is fairly complete, there is no simple explanation for why an individual becomes obese and how to treat it.

Dieting

Regardless of the cause, it is often very difficult for overweight people to take weight off and keep it off. Many dieters have had the experience of losing a great deal of weight and then discovering, much to their chagrin, that they regain the weight while eating much less than before they started their diet. Why does this happen?

When people go on a diet, especially a starvation diet, there is a pronounced reduction in their resting metabolic rate—the energy the body uses when in the resting state. This change in metabolic rate occurs because the body actually resists the weight loss. Ironically, the dieter and his or her body are working toward opposite goals. Although the dieter wants to take off extra pounds and inches, the body reacts to the sharp reduction in food intake as if it were protecting itself from starvation. It slows down its metabolic rate to conserve energy, thus ensuring that the brain, heart, and other vital organs will have sufficient fuel.

This change in metabolic rate produces highly inconvenient results for the dieter. For instance, assume that you normally consume 3,000 calories per day and you suddenly begin an 800-calorie diet. At first, you may experience weight loss. Then your body will eventually lower its resting metabolic rate to conserve its fat stores, resulting in the likelihood of hitting a plateau. If you tough it out, however, you will be able to reach your weight goal.

At this point, you will want to begin eating a more reasonable diet again—but beware. Your body is now likely to play one of its cruelest tricks. Used to conserving energy, your metabolism will continue running in low gear. Thus, even a modest increase in calorie consumption (often well below your pre-diet level) may result in gaining the pounds back. It may take weeks or months for your metabolism to readjust to a normal level, and by then you may have given up in disgust.

This scenario sounds discouraging; however, as with everything else, there are right ways and wrong ways of dieting. The *Applying Psychology* discussion toward the end of the chapter provides additional information to keep in mind if you are trying to lose weight. Remember, however, that no safe method will work quickly and easily. All weight-loss programs require considerable persistence.

8.3b Anorexia and Bulimia

Anorexia nervosa may affect as many as five in every one hundred teenage women. Within certain subgroups, particularly among athletes, the incidence increases to at least 35 percent. In recent years, there has been increasing recognition that this disorder often demonstrates early onset, occurring in prepubertal children age fourteen or younger. Anorexia is characterized by a prolonged refusal to eat adequate amounts of food. The result may be emaciation and even death, mostly caused by cardiac complications. Although most recorded cases of anorexia occur among women in their teens or early twenties, males, children, and older adults may also be afflicted.

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Anorexia is a serious disorder that can result in emaciation and death.

While the causes of anorexia are still being investigated, clearly social influence, via the media and peers, probably plays a significant role in most cases. People with anorexia nervosa often have a distorted body image in which they perceive themselves as attractive only when dangerously thin (American Psychiatric Association, 2013).

Bulimia is a disorder in which a person, most commonly a young woman in her teens or twenties, engages in periodic episodes of binge eating and then uses either vomiting or a laxative to purge the body. Some bulimics maintain normal weight, and others are also anorexic. In one study, approximately half of the patients hospitalized for anorexia indicated that they periodically resorted to bulimic purges. Bulimia is especially common among college women; its incidence has been estimated to be as high as 20 percent.

Many people with bulimia frequently manifest depression, anxiety, sleep disturbances, poor body image, guilt, and substance abuse. In addition to these psychological problems, bulimia contributes to a variety of physical complications, including cardiac complications resulting from the loss of potassium, gastrointestinal difficulties, extensive tooth decay and enamel deterioration from vomiting, and hair loss.

Both anorexia and bulimia are serious disorders that may be fatal. As a result, many campus health and counseling centers, and a growing number of urban hospital centers, have added specialists to their staff who are experienced in treating eating disorders. A variety of therapeutic strategies have been shown to be effective in treating anorexia and bulimia, including the use of antidepressants and counseling. Although most patients recover from these disorders, as many as 30 percent may never respond to treatment and will prematurely die from the complications (Brown & Mehler, 2013; Wilfley et al., 2012).

Anorexia Nervosa Eating disorder characterized by prolonged refusal to eat adequate amounts of food; most common among young adults

Bulimia Eating disorder characterized by periodic episodes of binge eating followed by deliberate purging using either vomiting or laxatives

Sensation-Seeking Motives An explanation for the apparent need for certain levels of stimulation, including the need to explore the environment and the need for sensory stimulation

8.4 Sensation-Seeking Motivation

Humans and other animals seem to require a certain amount of stimulation in order to feel good and function effectively. The need to manipulate and explore the environment and the need for sensory stimulation both fall under the category of **sensation-seeking motives**. These motives seem to be natural to a broad range of mammals. Observation of infants of many species, including humans, reveals a strong inclination to explore and manipulate the environment as soon as they are able. Animals have been shown to expose themselves willingly to various kinds of stimulation in the apparent effort to raise their level of physiological arousal. For example, young monkeys provided with mechanical puzzles, such as metal clasps used to seal a door, will tirelessly manipulate the object with no apparent reward beyond the opportunity to manipulate something.

We can observe this same drive in ourselves. Very few of us are content with constant, never-changing environments. Sometimes we seek quiet and solitude, but after a time we are likely to seek the sounds and sights of people and activity. We turn on the television, jog, play tennis, talk on the phone, and so forth. We may thrive on challenging games, complex puzzles, or the opportunity to explore new things.

Some psychologists believe that the motivation to seek stimulation evolved in many species because of its survival value. Organisms that explore and manipulate their environment become more aware of its parameters of safety and danger. But what about individuals who seek out stimulation by engaging in high-risk behaviors such as skydiving, bungee jumping, rock climbing, and even drug use? Do these individuals have a greater need for stimulation than others? Several lines of research suggest that the brains of individuals who seek stimulation and novelty differ in critical ways from those who do not. For example, research comparing low- and high-sensation-seeking individuals does reveal different patterns of physiology in reaction to aversive and fear-producing events. Low sensation seekers display greater startle responses to stimuli that precede aversive stimulation than do high sensation seekers (Lissek et al., 2007). In addition, the brains of sensation seekers have lower numbers of dopamine receptors in several midbrain regions. It is believed that sensation-seeking behaviors, like drug use, increase the activity of these otherwise depressed dopamine neurons, thereby giving these individuals a greater boost in rewarding effects of dopamine (Norbury et al., 2015; Zald et al., 2008).

8.4a Optimum Level of Arousal

Arousal is a general concept referring to a behavioral state; we experience arousal as the ability to process information effectively and to engage in motivated behavior. A certain minimum level of arousal is essential in order to express goal-directed behavior. Conversely, too much arousal may leave us overstimulated, overloaded, and temporarily incapable of effective action. A number of researchers, most notably Donald Hebb (1955), have theorized that people have an optimum level of arousal, which is the level where their performance will be most efficient.

Arousal A physiological state in which an individual is able to process information effectively and to engage in motivated behavior

Optimum Level of Arousal Level of arousal at which an individual's performance on a specific task is most efficient

Yerkes-Dodson Law Principle that the optimum level of arousal for peak performance will vary somewhat depending on the nature of the task

According to Hebb's **optimum level of arousal** theory, our performance on a task will improve as arousal increases up to an optimal level. Further increases will begin to interfere with our efficiency. This theory has been generally supported by research, but with some exceptions. For example, low levels of arousal have frequently been shown to hinder performance, but not under all experimental conditions (Orne & Scheibe, 1964).

The Yerkes-Dodson Law

The optimum level of arousal seems to vary according to the type of task a person is performing. For instance, the high arousal level you need to compete successfully in a 100-meter race would be inappropriate and even counterproductive for some other tasks, such as writing a book review.

According to the **Yerkes-Dodson law**, the optimum level of arousal for peak performance varies somewhat depending on the nature of the task (Yerkes & Dodson, 1908). If you are involved in a simple task, you probably perform best if your arousal level is relatively high. Conversely, you are likely to do better on a difficult task if your arousal level is somewhat lower. Figure 8–2 demonstrates the relationship between arousal and performance as predicted by the Yerkes-Dodson law. It is now generally recognized

that the Yerkes-Dodson law somewhat oversimplifies the complex relationship between arousal and performance. Nevertheless, data from diverse studies have generally supported these researchers' formulation (Watters et al., 1997).

8.5 Sexual Motivation and Behavior

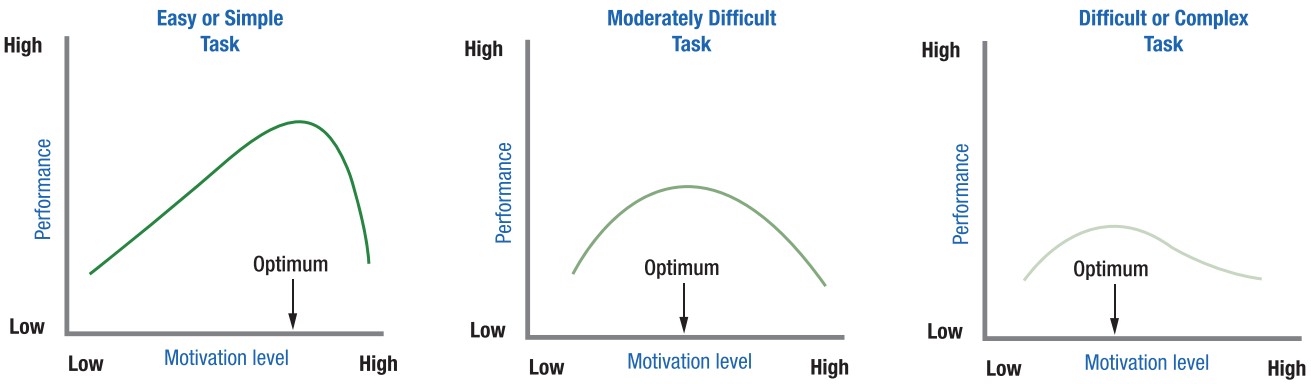
Another important source of motivation is sexual motivation. Our sexuality is a richly varied, highly individualized, and potentially enriching aspect of our lives. We express our sexuality in many ways, and the feelings, thoughts, and attitudes we bring to this area of human experience also vary widely. In the remainder of this chapter, we present a brief overview of selected topics, which provide an introduction to certain behavioral, biological, psychosocial, and cultural aspects of sexuality. We will see how human sexual behavior can be motivated by all of these factors.

We begin by exploring the question of how biological and psychosocial factors influence human sexual behavior. It was once thought that sexual behaviors were motivated primarily by a physiological drive, mostly because of the dominant role of physiology in animal sexual behavior. In nonprimate mammals such as rats, for instance, hormones appear to be essential to sexual arousal and function. However, there is now general agreement that learning, emotions, and social norms become more important as the complexity of the organism increases. In humans, sexual interest and expression are controlled both by hormones and, even more, by the cerebral cortex—reflecting a combination of biological, psychological, and cultural factors.

All this is not to say that biology is irrelevant to human sexual motivation. In the following sections, we compare the effects of biological and psychosocial factors to see how they contribute to sexual motivation and arousal.

Figure 8–2 The Yerkes-Dodson Law Applied to the Concept of an Optimal Level of Arousal

The optimal level of arousal varies depending on task difficulty.



Adapted from "The relation of strength of stimulus to rapidity of habit formation," R. M. Yerkes and J. D. Dodson, 1908, *Journal of Comparative Neurological Psychology, 18*(5), 459–482.

8.5a Biological Bases of Sexual Behavior

It is extremely difficult to distinguish between the effects of strictly physiological processes such as hormone production and those of psychosocial processes such as early socialization, peer group learning, and emotional needs. In recent years, however, a number of well-designed, carefully implemented studies have yielded information about the complex relationship between hormones and sexual activity. Which hormones are important in human sexuality? Have different hormones been linked with male versus female sexual functions? Take a few moments to consider these questions before reading on.

Hormone Levels and Male Sexual Behavior

The primary male sex hormones are **androgens**. The testes secrete about 95 percent of these androgens in the form of testosterone; the remaining 5 percent are produced by the adrenal glands. A number of lines of research have linked androgens with sexual activity. One source of information has been studies of men who have undergone castration (an operation involving removal of the testes, which is sometimes performed as medical treatment for such diseases as genital tuberculosis and testicular cancer). In one major investigation of a large group of castrated Norwegian males, most subjects reported significantly reduced sexual interest and activity within the first year after the operation (Bremer, 1959). However, other research suggests that castration has a highly variable effect on sexual desire and functioning. In one case, a forty-three-year-old man, castrated eighteen years previously, reported having intercourse one to four times weekly (Hamilton, 1943). Other writers have recorded incidences of continued sexual desire and function as long as thirty years following castration, without hormone treatment (Ford & Beach, 1951). Such findings, together with numerous other investigations, suggest that while sexual interest and activity generally diminish after castration, the amount of reduction is highly variable. The fact that this diminution occurs so frequently indicates that hormones are important in instigating sexual interest.

Androgens Male sex hormones, the most common of which is testosterone

A second line of research investigating hormones and sexual functioning involves androgen-blocking drugs. Antiandrogens drastically reduce the amount of testosterone circulating in the bloodstream. One of these drugs, *medroxyprogesterone acetate* (MPA, also known by its trade name, Depo-Provera®), has been used effectively to treat sexual offenders (Emory et al., 1995; Lehne & Money, 2000). However, altering sex hormone levels is far from a surefire treatment for sex offenders, especially in cases where sexual assaults have stemmed from nonsexual motives, such as the need to express anger or to exert control over another person.

A third source of evidence linking androgens to sexual motivation is studies of hypogonadism, a state of androgen deprivation that results from certain diseases of the endocrine system or radiation to treat cancer. If this condition occurs before puberty, maturation of the primary and secondary sex characteristics is retarded, and the individual may never develop an active sexual interest. In adult males, the results have been more controversial. However, in a comprehensive review of more than thirty years of research on testosterone treatment, it was concluded that when hypogonadal men receive testosterone treatment, they often experience a return of normal sexual interest and activity (Isidori et al., 2005).

Finally, there is evidence that males who take *anabolic steroids* (testosterone) to build muscle mass may experience increased levels of sexual motivation. Many professional and nonprofessional athletes take supplemental testosterone to increase hormone levels beyond their normal range. There is little doubt that supplemental testosterone is effective when used this way, and debates will rage for years about whether some Olympic records, cycling wins, and home run records would have been achieved without testosterone supplements.

Hormone Levels and Female Sexual Behavior

Estrogens Hormones that influence female sexual development

Many people assume that the female sex hormones, **estrogens**, play a major role in female sexual motivation and behavior. We do know that these hormones help maintain the elasticity of the vaginal lining and contribute to vaginal lubrication (Walling et al., 1990). However, the role of estrogens in female sexual motivation is far from clear (Panjari & Davis, 2010).

Estrogens are not the only sex hormones present in females, however. Both the ovaries and the adrenal glands produce androgens in females, and the connection between androgens and female sexual motivation seems somewhat more substantial. Some of this evidence is anecdotal. For instance, the clinical literature on gynecology cites many cases in which women undergoing androgen therapy experience increased sexual interest and activity (Apperloo et al., 2003; Davis & Braunstein, 2012).

While androgens can be used to increase libido in both men and women, it is important to remember that interest in sexual behavior is dependent on many factors. Androgens by themselves are not sufficient to motivate sexual behavior in humans, even though they are often prescribed to treat sexual dysfunctions.

8.5b Psychosocial Factors in Sexual Behavior

Although hormones can, and do, influence human sexual motivation, our sexual behaviors are not strongly correlated with reproductive cycles and related biological events. Other animals stand in sharp contrast. Female sexual receptivity in other animals is governed by the reproductive cycle; biological cues (such as odors) are often necessary to instigate sexual activity, and hormone levels are closely tied to the ability to respond sexually.

In contrast, hormones are far from the only important factor influencing human sexuality. Indeed, it is likely that psychological and cultural conditions play a greater role in human sexual arousal and expression. Some evidence of the influence of psychosocial factors comes from our own experiences and observations. Ask yourself, for instance, what motivates your own sexual behavior, and what are the most important restrictions on your sexual behavior?

Most of us continue to express our sexuality throughout much of our lives because sexual activity is reinforcing. This reinforcement takes many forms, including a sense of self-esteem that comes from being loved, erotic pleasure and gratification, reduction of feelings of anxiety, and a sense of closeness to another person. Sexual expression can even serve the function of providing a way of relieving boredom and raising arousal levels. This diversity of reinforcers suggests that our incentives for sexual expression are largely psychosocial. It also underscores the basically social nature of humans, a propensity that greatly influences the manner in which we express our sexuality.

Societal Influences on Sexual Behavior

Social scientists have recorded in detail the tremendous variation that occurs in human sexual behavior in different societies (Crooks & Baur, 2014). Societies exist in which individuals in their sixties are more active sexually than the typical thirty-year-old American. In many societies, the marked gender differences in adolescent sexual behaviors that typify our own society are totally lacking. Such widespread fluctuations in sexual norms and behavior cannot be attributed to the influence of hormones.

Nor can they be attributed to geographical factors. No other animal species has different sexual behaviors in different parts of the world. Rats in Ethiopia copulate the same way and are triggered by the same stimuli as rats in Oregon. The sexual patterns of dogs, cows, fowl, and higher primates are all highly similar, regardless of where they live. Thus, humans are unique in creating highly localized patterns of sexual behavior. This is perhaps the strongest evidence for the preeminence of psychosocial factors in human sexual motivation and expression.

Many of us have our own ideas about what is "normal" sexual behavior and what is not, but often the meaning of a given act (sexual or otherwise) cannot be fully understood without also understanding its cultural context. For example, in our own North American society, we may attribute sexual overtones to the act of two men embracing each other. In Italy, however (and in many other societies), it is completely normal (and nonsexual) for men to hug one another.

Such diversity exists among the cultures of the world that the very definition of what is sexually arousing may vary greatly. In one society, exposed female breasts may trigger sexual interest in men, whereas in a different society this sight may induce little or no erotic interest. Furthermore, the acceptability of certain sexual activities varies widely from culture to culture. In some societies, such as the Mangaians of Polynesia, sex is highly valued and almost all manifestations of it are considered beautiful and natural. Other societies, such as on the Irish island of Inis Beag, view any sexual act as undesirable and shameful (Crooks & Baur, 2014). Almost any sexual behavior is viewed in widely different ways in different societies. Masturbation by children may be overtly condemned in one society, covertly supported in another, openly encouraged in still another, and even occasionally initiated by parental example.

The diversity of sexual expression tends to mask a fundamental generalization that can be applied without exception to all social orders: Within the **cultural mores** (established customs and beliefs) of all societies, the conduct of sexual behavior is regulated in some way. The rules vary from one society to the next, but in no social order is sexuality completely unregulated.

Cultural Mores Established customs or beliefs in a particular culture

The best way to understand the diversity of sexual expression is through examples. We look briefly at three societies with very different views of sexuality: the Polynesian society of the island Mangaia, the inhabitants of an island off the coast of Ireland known as Inis Beag, and the Dani of New Guinea. (These social groups have all been studied at some time during the last few decades. However, they may have undergone cultural change since they were observed.)

Mangaia Mangaia is the southernmost of the Polynesian Cook Islands chain. In the 1950s, anthropologist Donald Marshall (1971) studied the inhabitants, and his accounts of Mangaian sexual practices have been widely quoted. When Marshall visited Mangaia, he observed a society in which sexual pleasure and activity is a principal concern, starting in childhood (Marshall, 1971). Children have extensive exposure to sexuality. They hear folktales containing detailed descriptions of sex acts and sexual anatomy, and they

watch provocative ritual dances. At the onset of puberty, both sexes receive detailed instruction about sex. Once their instruction is completed, boys begin to seek out girls. Sex occurs in public privacy. Young males engage in a practice called *night-crawling*, in which boys enter their chosen lover's house at night and have sexual relations while other family members sleep nearby. (In the 1950s, when Marshall conducted his research, most Mangaian houses had only a single sleeping area.) If awakened, the other five to fifteen family members politely pretend to sleep. Parents approve of this practice and listen for sounds of laughter as a sign that their daughter is pleased with her partner. They also encourage their daughters to have a variety of lovers so that they may find a sexually compatible marriage partner. Young men gain social prestige through their ability to please their partners. These patterns persist on a daily basis throughout the adolescent years for unmarried men and women.

Sexual relations continue to occur frequently after marriage. A wide range of sexual activity is approved, including oral-genital sex and a considerable amount of touching before and during intercourse. Among the Mangaians, then, sexual activity is not only condoned but also actively encouraged.

Inis Beag In the community of the Irish island known as Inis Beag (a pseudonym), a sharp contrast to Mangaian practices is observed. When anthropologist John Messenger (1971) studied this society between 1958 and 1966, he observed that sexual expression is discouraged from infancy on. Mothers avoid breastfeeding their children, and after infancy parents seldom kiss or fondle them. Children learn to abhor nudity. They learn that elimination is dirty and that bathing must be done only in absolute privacy. Any kind of childhood sexual expression is punished.

As they grow older, children usually receive no information about sex from their parents. Young girls are often shocked by their first menstruation, and they are never given an adequate explanation of what has happened. Priests and other religious authorities teach that it is sinful to discuss premarital sexual activity, masturbation, or sex play. Religious leaders on the island have denounced even *Time* and *Life* magazines as pornographic.

Marriage partners generally know little or nothing about precoital sex play, such as oral or manual stimulation of the breasts and genitals. Beyond intercourse, sexual activity is usually limited to mouth kissing and rough fondling of the woman's lower body by the man. Men invariably initiate sex, using the man-on-top coital position, and both partners usually wear nightclothes during coitus. Female orgasm is unknown or considered a deviant response.

Sexual misconceptions continue through adulthood. For example, many women believe that menopause causes insanity, and some women confine themselves to bed from menopause to their death. During menstruation and also during the months following childbirth, men consider intercourse to be harmful to them. Many men also believe coitus to be debilitating, avoiding sex the night before a strenuous job. In general, sexual expression in Inis Beag is marked by anxiety-laden attitudes and rigid restrictions.

The Dani of New Guinea In both Mangaia and Inis Beag, sexuality receives a great amount of attention, albeit in different ways. In contrast, the Dani people of West New Guinea seem to be largely indifferent to sexuality (Heider, 1946). Sexual activity is infrequent among adults. Although courtship covers an extended period (marriages are held only during a certain feast that occurs every four to six years), there is almost no premarital sex. After marriage, a couple abstains from sex for at least two years and then has infrequent coitus. Following the birth of a child, husband and wife do not have sex for four to six years. During this time there is no reported masturbation, and extramarital sex is rare.

According to Karl Heider, who studied this society in the 1960s, the Dani culture does not overtly enforce these behavior patterns. Heider also observed no indications of hormonal or physiological deficiencies that could result in low sexual interest. In general, the Dani are relaxed, physically healthy people who live in a moderate climate and have an adequate food supply. They appear to be very calm, only rarely expressing anger. Heider believes that the apparent infrequency of sexual activity reflects the Dani's relaxed lifestyle and their low level of emotional intensity.

8.5c Sexual Orientation and Identity

We have seen that the norms of sexual expression may vary considerably from society to society. Yet even within a single society, individuals express their sexuality in different ways. In this section, we explore two variations in sexual behavior: sexual orientation and identity.

Different people have different views of what is sexually exciting, and sexuality can be expressed in a variety of ways. One way in which sexual expression varies from person to person is in **sexual orientation**—that is, the gender to which an individual is attracted. Attraction to partners of the same sex is called homosexual orientation, and attraction to partners of the other sex is called heterosexual orientation. Bisexuality refers to attraction to partners of both sexes.

Sexual Orientation Gender to which an individual is attracted

Homosexuality Primary erotic, psychological, and social interest in members of the same sex, even though that interest may not be expressed overtly

Sexual Identity The sex to which one identifies, as opposed to whom one is attracted

Transgender Individuals who dress and act according to their self-identified sex

Most people think of homosexuality as sexual contact between individuals of the same sex. However, this definition is limited in that it does not encompass all of the meanings of the term homosexual, which can refer to (1) sexual behavior, (2) emotional affiliation, and (3) one's own self-definition. The following definition incorporates a broader spectrum of elements: A **homosexual** person is an individual whose primary erotic, psychological, emotional, and social interest is in members of the same sex, even though that interest may not be overtly expressed. A male homosexual is commonly referred to as gay while a female is referred to as lesbian. A homosexual person's gender identity typically agrees with his or her biological or birth sex. That is, gay and lesbian individuals perceive themselves as male or female, respectively, and are attracted to people of the same sex.

In our society, we tend to make clear-cut distinctions between homosexuality and heterosexuality. The delineation is not so clear-cut, however. At one end of a broad spectrum, a relatively small percentage of people consider themselves exclusively gay or lesbian; at the other end, a greater number think of themselves as exclusively heterosexual. Between the two groups exist individuals with varying degrees of homosexual and heterosexual preference and experience. These individuals refer to themselves as bisexual.

The sex to which one identifies, as opposed to whom one is attracted to, is referred to as one's **sexual identity**. A relatively small proportion of people in the population (approximately 0.56 percent) do not identify with their biological or birth sex (Nolan et al., 2019). That is, a biological male may feel more legitimate identifying as a female, and vice versa. Often these individuals, considered **transgender**, dress and act according to their self-identified sex.

The incidence of lesbian, gay, bisexual, and transgender (LGBT) individuals in the United States is estimated to be approximately 5.6 percent. This incidence has almost doubled during the past ten years. This rapid rise in prevalence is most likely due to increased acceptance of LGBT individuals. Seventy-six percent of millennials are now in favor of same-sex marriages (Jones, 2021). However, anti-LGBT sentiment remains strong in certain segments of our society.

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One way in which sexual expression varies from person to person is in sexual orientation—the gender to which an individual is attracted.

Theories of Homosexuality

Several theories have attempted to explain the development of homosexuality. There is still no single clear answer, but research conducted by Alan Bell, Martin Weinberg, and Sue Hammersmith (1981) helps shed some light on the question. Bell and his colleagues used a sample of 979 homosexual people matched to a control group of 477 heterosexual people. All subjects were questioned about their childhood, adolescence, and sexual practices; their responses were analyzed using sophisticated statistical techniques. Much of the information presented in this discussion is based on this study's findings, to which we refer in evaluating both psychosocial and biological explanations of homosexuality.

Psychosocial Theories Some theories seek to explain homosexuality as the result of learning, personal experiences, parenting patterns, or the individual's own psychological attributes. For instance, one explanation for homosexuality is that it may be the result of unhappy heterosexual experiences or the inability to attract partners of the other sex.

Is homosexuality a learned response? Does homosexuality result from unhappy heterosexual experiences? This view is commonly voiced in the effort to explain lesbianism, which people often assume is based in resentment, dislike, fear, or distrust of men rather than an attraction toward women.

Perhaps the best way to evaluate this explanation of homosexuality is to turn the argument around. Is female heterosexuality caused by dislike and fear of women? The answer is no—just as lesbianism is not caused by unhappy experiences with men. In fact, research indicates that up to 70 percent of lesbian women have had sexual experiences with men, and many report having enjoyed them. However, they prefer to be sexual with women (Klaich, 1974).

Bell and his colleagues report that lesbianism is not related either to unpleasant heterosexual experiences or to a lack of such experience (1981). Their research found that homosexual and heterosexual people had dated about equally in high school, a finding that contradicts the notion that homosexuality results from a lack of heterosexual opportunity. Both gay and lesbian subjects did tend, however, to feel differently about dating than did heterosexual subjects—few of them reported enjoying it. These feelings probably indicate that these subjects were less interested in heterosexual relationships. For example, although the homosexual males dated as much as the heterosexual males in the study, they tended to have fewer sexual encounters with females. The researchers concluded that "unless heterosexual encounters appeal to one's deepest sexual feeling, there is likely to be little about them that one would experience as positive reinforcement for sexual relationships with members of the opposite sex" (p. 108).

Another myth dispelled by the Bell research team is that young men and women become homosexual because older homosexuals have seduced them. In reality, not only did most subjects (both male and female) report that their first homosexual encounter had involved someone of about their own age, but homosexual subjects were less likely than heterosexual subjects to have had initial sexual encounters with a stranger or an adult.

Some people may believe that homosexuality can be "caught" from someone else—for instance, that a homosexual teacher, especially one who is well liked and respected, will become a role model for students. However, homosexual orientation appears to be established even before school age, and modeling is not a relevant factor (Marmor, 1980).

Another theory helps link homosexuality to certain patterns in family background. Sigmund Freud (1905) maintained that children's relationships with their fathers and mothers were a crucial factor. Although Freud viewed men and women as innately bisexual, he thought that individuals normally passed through a "homoerotic" phase in the course of heterosexual development. Certain people could become "fixated" at the homosexual phase if some kinds of life experiences occurred, especially if a boy had a poor relationship with his father and an overly close relationship with his mother. Although Freud's theory is frequently cited, it has received little support from research. In fact, Bell and his colleagues found that no particular phenomenon of family life could be singled out as especially consequential in the development of either heterosexual or homosexual orientations.

Biological Theories of Homosexuality If psychosocial factors do not adequately account for a person's sexual orientation, is it determined by biology? This biological approach seems reasonable, because both sexual development and the expression of sexual behavior are determined by early hormonal influences on the developing body and brain.

One biological approach has focused on possible genetic contributions—that is, homosexuality may be determined by a "gay gene." Yet, considerable research occurring over sixty years has failed to identify genetic markers for a person's sexual orientation, even though there appears to be substantial heritability. The gay gene was first proposed in 1993, when researchers reported a correlation between a specific genetic marker and homosexuality. However, this research was never replicated, and its biological reality remains hypothetical or elusive at best. Investigators have now examined the entire human genome for evidence of a genetic determinant of homosexuality and have concluded that there is not sufficient evidence (Hyde, 2005). Researchers do believe, however, that **epigenetic** modifications to the way androgens masculinize the fetus and determine sexual preferences can and do occur (Rice et al., 2012). If epigenetics does contribute to sexual orientation, it most likely does so by altering developmental hormones, resulting in differences in brain structure that mediate sexual behavior.

Epigenetic Processes that alter gene expression without changing the DNA

Researchers speculate that prenatal hormone exposures can alter the masculine and feminine development of the fetal brain. There is a critical period during which the fetus is particularly sensitive to levels of testosterone. How could brain levels of testosterone be altered during gestation? Epigenetic alterations to androgen effects certainly can occur, as discussed above. In addition, evidence suggests that maternal stress during a critical period (perhaps between the second and the sixth months of pregnancy) results in decreased levels of fetal testosterone. The stress, which causes large amounts of adrenal hormones to enter the fetal bloodstream, inhibits the masculinization of the hypothalamus by testosterone. According to this theory, prenatal hormone imbalances during this period could contribute to homosexuality (Balthazart, 2012, 2020; Swaab et al., 2002). Laboratory research with animals has demonstrated that prenatal stress, which resulted in decreased levels of testosterone, also alters male sexual behavior. Prenatally stressed male rats responded to injections of testosterone with an increase in female sexual behavior (McLeod & Brown, 1988).

In conclusion, research seems to suggest that people may be biologically predisposed toward homosexuality as a consequence of epigenetics or abnormalities in testosterone exposure during prenatal development. The prenatal endocrine environment has a significant impact on sexual differentiation and behavior later in life. At this point, however, it seems most appropriate to think of sexual orientation as influenced by a variety of environmental and biological factors that are unique for each person, rather than trying to find a single cause.

Applying Psychology

Some Suggestions for Overcoming Obesity

Countless solutions have been proposed to deal with weight problems. Nevertheless, the great majority of obese people who try to reduce and maintain a lower weight ultimately fail. This discussion presents a few suggestions based on the clinical experiences and experimental findings of weight-loss specialists. Note: It is a good idea to consult a physician before embarking on a weight-loss program.

1. **Determine your calorie intake.** Many people are convinced they are overweight not because they eat too much, but rather because they have metabolic problems. Most adults of normal weight consume about 2,000 to 2,500 calories during each twenty-four-hour period, depending on their size, sex, and activity level. If you are overweight and convinced that you eat no more than your skinny friends, try keeping a record of everything you eat and drink for a period of a week or so. (There are a number of computer programs and cell phone apps that can help you track caloric intake.) Some people are shocked at the number of calories they consume without thinking about what they are doing.

2. **Reduce food intake, if necessary.** We add the disclaimer "if necessary" because for some obese people whose food consumption is in fact moderate, exercise without dieting may be more effective than eating less. However, if you are consuming more than a normal allotment of calories, it is helpful to reduce the amount you eat, particularly foods high in fat and sugar content. Consult a physician, dietician, or authoritative textbook to be sure your reduced food intake provides a healthy, balanced diet.

   Avoid crash diets that may reduce calories to only a few hundred a day. Your odds for success are much better if you cut back only moderately on daily calorie consumption. Research clearly demonstrates that a slow, steady weight loss, of perhaps only a pound or two per week, increases your chances of keeping excess pounds off once you reach your desired weight.

   Several tips may help you lower food consumption moderately. First, try stocking up on nutritious food that does not inspire lust in your taste buds. Get rid of cookies, candies, ice cream, porterhouse steaks marbled with fat, potato chips, cream cheese, soft drinks, and anything else you love to consume. It is a good idea to allow for some interesting variety in your diet so that you will not end up feeling so deprived that you lose all control and binge. Remember, losing weight and keeping it off will require a change in eating patterns lasting perhaps the rest of your life.

   Second, commit yourself to eating only at mealtime and always in the same place. This helps eliminate the urge to snack that often results from learned associations between certain activities and food (for example, raiding the refrigerator during TV commercials). It can also be helpful to reduce access to foods that require no preparation. It is all too easy to nibble from an open box of crackers or cookies without even thinking about what you are doing.

3. **Exercise.** When used in conjunction with reduced food intake, regular, moderate exercise is probably the best strategy for losing weight. Unfortunately, however, some people make the mistake of thinking they will drop all excess weight in a Herculean exercise program. Like crash diets, this strategy often fails due to physical burnout, injury, or boredom.

   Moderation is the key for most people. If you can burn off 200 to 300 calories each time you exercise, you will obtain noticeable results in a reasonable amount of time (assuming, of course, that your food intake is held to a moderate level). Most specialists recommend exercise sessions that last a minimum of twenty to thirty minutes and occur at least three times a week. The activities you choose should be strenuous enough to raise your heart rate appreciably and to allow you to burn 200 to 300 calories per session. All kinds of exercise possibilities exist. Choosing one that is relatively enjoyable, or at least not unpleasant, will pay dividends in greater perseverance. Studies indicate that thirty minutes of brisk walking burns off about 150 calories; bicycling on normal terrain burns off 200 calories; swimming, 275 calories; and jogging, 370. For many people, exercise actually seems to decrease the appetite.

   Recent research demonstrates that people who exercise either very intensively or for very long periods may experience an increase in their metabolic rate that can last for two or three days after cessation of exercise. In addition, the more muscle tissue a person has in relation to fat, the greater his or her metabolic rate. Muscle tissue consumes more calorie energy than fat. Such findings suggest that an exercise regimen that combines muscle building with extended periods of cardiovascular exercise (such as jogging, bicycling, or swimming for a couple of hours several times a week) may be the optimal strategy for weight control. However, such a rigorous exercise program poses the risk of burnout or perhaps injury for individuals who do not build slowly into a program in accordance with the rate of improvement in their physical fitness.

4. **Keep records and reward yourself.** Research indicates that people who keep records of how much they eat, when they eat, and what exercises they do before and during eating are more likely to benefit from a weight-loss program than those who do not record this information. These records may reveal certain patterns of which you were unaware, such as a tendency to eat more in the company of a certain friend or raiding the refrigerator when you are feeling depressed.

It may be helpful to include others in your efforts to lose weight. Sometimes the first 5 or 10 pounds are the toughest because nobody seems to notice. However, having someone around to praise you for the pound or two you have lost can be very reinforcing.

Setting up little rewards along the way can also be helpful. Perhaps you can treat yourself to a professional massage after you drop the first 5 pounds. Maybe after 10 or 15 pounds, you can purchase some new outfits to reveal your new appearance.

Note: These recommendations are similar to the popular Noom weight-loss program (Noom.com). The program requires the use of a cell phone app where you log your food intake and then are given recommendations on possible better food choices. The app also logs your activity using a built-in pedometer to track steps and make recommendations on how to increase activity. The program may be successful because it doesn't require you to eliminate your favorite foods or to engage in an impossible exercise program. It provides constant feedback and choice alternatives to help you learn more healthful patterns of eating and exercise. It also provides links to articles that may be helpful in your pursuit of a healthy lifestyle. This *Applying Psychology* segment should help you realize that even the term "diet" may be inappropriate. The term implies something temporary, thus the return to pre-dieting weights for most folks. Rather, you should view your weight-loss program as a permanent change in lifestyle and eating choices.

Chapter Review

The Nature of Motivation

1. Motivation can be defined as any condition that energizes and directs behavior.
2. Motivation not only energizes or activates us to behave in a certain way; it also defines the direction of the resulting behavior. Motivation also has a direct impact on how vigorous or intense our behaviors are.

Motivational Explanations of Behavior

3. One of the earliest attempts to explain motivation was based on the notion of instincts, innate patterns of behavior that occur in every normally functioning member of a species under certain set conditions.
4. Because learning so profoundly influences our behaviors, it is essentially impossible to find one example of human behavior that fits the literal definition of instincts.
5. According to the drive-reduction theory, motivation originates with a need or drive, experienced as an unpleasant aversive condition, which motivates us to act in a way that will reduce the aversive condition. This theory, while limited in scope, does explain some aspects of motivation.
6. According to the cognitive perspective, our beliefs and expectations play an important role in motivating our actions.
7. One way to help instill a desire to achieve is to encourage children to set reasonable goals and to provide ample reinforcers for their successes.
8. It is useful to classify human motives under four categories: biologically based motives rooted primarily in body tissue needs; sensation-seeking motives expressed as a need for certain levels of stimulation; complex psychosocial motives that seem to demonstrate little or no relationship to biological needs; and multifactorial motives that are based on a combination of biological, psychological, and cultural factors.
9. According to the hypothalamic control theory, two regions within the hypothalamus may possibly serve as control centers for eating. One region, the ventromedial hypothalamus, seems to act as a satiety center that signals when an organism has had enough to eat. In contrast, the lateral hypothalamus seems to act as an "on switch" that instigates eating. New research suggests that although these areas of the hypothalamus are important, they do not act as mere on-off switches for eating. Rather, other hypothalamic structures, including the arcuate nucleus and the neurotransmitter neuropeptide Y, are also critical.
10. Blood glucose levels are monitored by cells within the hypothalamus which, in turn, stimulate either feeding or satiety mechanisms.

Eating Disorders: Obesity, Anorexia, and Bulimia

11. Obesity places a person at risk for developing one or more serious health problems, such as high blood pressure, heart disease, and depression.
12. Genetic factors, conditions of early development, emotional stress, and metabolic factors all have been suggested as possible causes of obesity.
13. Suggested causes for anorexia nervosa and bulimia include a disturbed body image, depression, anxiety, and possibly physical abnormalities involving neurotransmitters, the hypothalamus and/or the endocrine system.

Sensation-Seeking Motivation

14. The need to manipulate and explore the environment and the need for sensory stimulation both fall under the category of sensation-seeking motives.
15. Psychologists have theorized that people have an optimum level of arousal, which is the level where their performance will be most efficient. According to the Yerkes-Dodson law, the optimum level of arousal for peak performance varies, depending on the difficulty of the task.
16. In humans, sexual interest and expression are controlled less by hormones and more by the cerebral cortex, reflecting a complex combination of biological, psychological, and cultural factors.
17. While it is difficult to distinguish the effects of sex hormones and learning experiences on sexual arousal, research does indicate that androgens appear to facilitate sexual interest in both males and females.
18. Psychological and cultural conditions probably play a greater role than hormones in human sexual motivation. This tendency is reflected in the role of reinforcement and psychosocial conditioning, which maintain and constrain sexual expression, respectively.
19. Ideas about what is sexually arousing vary greatly across the cultures of the world. Sexual conduct is regulated in some way in all societies, but the rules vary from one society to the next.
20. A high rate of sexual activity and extensive sexual instruction of youths is the norm on the Polynesian island of Mangaia.
21. On the Irish island of Inis Beag, sexual expression is discouraged from infancy through old age. Sexual misinformation is common, and female orgasm is practically unknown.
22. The Dani people of New Guinea demonstrate little interest in sexual activity and abstain from sex for years at a time.

Sexual Motivation and Behavior

23. There are a number of psychosocial and biological theories that attempt to explain the development of homosexuality. Some of the psychosocial theories relate to parenting patterns, life experiences, or the psychological attributes of the person.
24. Epigenetic changes in hormonal expression may occur before birth and alter specific brain structures that influence sexual orientation and identity.
25. Theories of biological causation of homosexuality look to genetic and prenatal influences on hormone levels and sexual differentiation of the brain.
26. Evidence suggests that abnormalities in prenatal exposure to testosterone affect both sexual differentiation of the brain and sexual behavior later in life.

Terms and Concepts

Androgens pg. 341
Anorexia Nervosa pg. 338
Arcuate Nucleus pg. 333
Arousal pg. 339
Biologically Based Motives pg. 330
Bulimia pg. 338
Cholecystokinin (CCK) pg. 334
Cognitive Dissonance Theory pg. 329
Cognitive Expectancy pg. 329
Cultural Mores pg. 343
Drive pg. 330
Epigenetic pg. 347
Estrogens pg. 342
Glucostatic Hypothesis pg. 333
Homosexuality pg. 345
Incentive pg. 326
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Lateral Hypothalamus (LH) pg. 332
Leptin pg. 334
Motivation pg. 324
Need for Achievement (nAch) pg. 328
Neuropeptide Y (NPY) pg. 333
Obesity pg. 335
Optimum Level of Arousal pg. 339
Sensation-Seeking Motives pg. 338
Sexual Identity pg. 345
Sexual Orientation pg. 345
Transgender pg. 345
Ventromedial Hypothalamus (VMH) pg. 331
Yerkes-Dodson Law pg. 339

Pop Quiz

True or False

___ 1. The concept of motivation incorporates both physiological and cognitive factors that influence behavior.

___ 2. The idea that your likelihood of being motivated to take an advanced course in math is determined in part by your success with difficult math courses in the past is known as cognitive advantage.

___ 3. Obese individuals have the same number of fat cells as normal-weight individuals, but these obese individuals' fat cells are 50–100 percent larger.

___ 4. Sensation-seeking motivations are based on our strong inclination to explore and manipulate the environment as soon as we are able.

___ 5. There is evidence to link androgens with sexual activity and motivation in both males and females.

Multiple Choice

6. Which of the following is *not* an effect motivation has on our actions?
   a. It directs or defines the direction of the resulting behavior.
   b. It has an impact on how vigorous or intense a behavior is.
   c. It controls instinctive behaviors.
   d. It energizes or activates one to behave in a certain way.

7. Which of the following behaviors illustrates the glucostatic theory of hunger?
   a. Some people prefer sweet foods over other tastes.
   b. People can easily detect changes on their blood glucose levels.
   c. People are only hungry when blood glucose levels drop.
   d. Drugs that deplete glucose cause immediate eating in animals.

8. Which of the following statements is *not* true about need for achievement (nAch)?
   a. People with a high level tend to be optimistic about chances of success.
   b. It can be measured using TAT.
   c. Studies have found that people with high levels of nAch tend to have stronger egos.
   d. Levels of nAch vary from individual to individual.

9. There is evidence that the stomach contains which of the following?
   a. Caloric receptors
   b. Glucoreceptors
   c. Liporeceptors
   d. Pressure detectors

10. A potent hormone that stimulates hunger and eating is which of the following?
    a. Leptin
    b. Neuropeptide Y
    c. Cholecystokinin
    d. Pancreatic hormone
11. Which one of the following does *not* stimulate hunger and eating behavior?
    a. Increased levels of the hormone neuropeptide Y
    b. Reduced blood sugar levels
    c. Increased levels of glycerol in the bloodstream
    d. Stimulation of the lateral hypothalamus
12. Following dramatic weight loss as a result of a very low-calorie diet (a starvation diet), why do people frequently regain much of the "lost" weight?
    a. They "fall off the wagon" and engage in binge eating.
    b. Their bodies need to restock stored fat.
    c. Their resting metabolic rate had increased during the diet, and following the diet it is reduced.
    d. Their resting metabolic rate was reduced during the diet and stays at the lower level following the diet.
13. Which of the following statements is true?
    a. Androgen-blocking drugs such as Depo-Provera may be effective in reducing sexual interest and activity in human males.
    b. Following castration (removal of the testes), human males always report a dramatic decrease in sexual desire and behavior.
    c. Estrogens play a significant role in the sexual interest and activity of human females.
    d. There is no systematic relationship between blood androgen levels and strength of sexual motivation in young men.
14. Which society most actively encourages (encouraged) sexual activity?
    a. Colonial American
    b. Mangaia (in the Polynesian Islands)
    c. Dani (of New Guinea)
    d. Inis Beag (on an Irish island)
15. According to the text's definition of homosexuality, which of the following is true?
    a. Only men can be homosexual; women with a "homosexual orientation" are lesbians.
    b. Homosexuals have a gender identity disorder.
    c. A homosexual cannot engage in heterosexual activities.
    d. It is not necessary to overtly express homosexual behavior to be homosexual.

Answer Key: 1.T 2.F 3.T 4.F 5.T 6.c 7.d 8.c 9.d 10.b 11.c 12.d 13.a 14.b 15.d