Chapter 10
Emotions and Motivations

Captain Sullenberger Conquers His Emotions

He was 3,000 feet up in the air when the sudden loss of power in his airplane put his life, as well as the lives of 150 other passengers and crew members, in his hands. Both of the engines on flight 1539 had shut down, and his options for a safe landing were limited.

Sully kept flying the plane and alerted the control tower to the situation:

> *This is Cactus 1539…hit birds. We lost thrust in both engines. We're turning back towards La Guardia.*

When the tower gave him the compass setting and runway for a possible landing, Sullenberger's extensive experience allowed him to give a calm response:

> *I'm not sure if we can make any runway…Anything in New Jersey?*

Captain Sullenberger was not just any pilot in a crisis, but a former U.S. Air Force fighter pilot with 40 years of flight experience. He had served as a flight instructor and the Airline Pilots Association safety chairman. Training had quickened his mental processes in assessing the threat, allowing him to maintain what tower operators later called an "eerie calm." He knew the capabilities of his plane.

When the tower suggested a runway in New Jersey, Sullenberger calmly replied:

> *We're unable. We may end up in the Hudson.*

The last communication from Captain Sullenberger to the tower advised of the eventual outcome:

> *We're going to be in the Hudson.*

He calmly set the plane down on the water. Passengers reported that the landing was like landing on a rough runway. The crew kept the passengers calm as women, children, and then the rest of the passengers were evacuated onto the boats of the rescue personnel that had quickly arrived. Captain Sullenberger then calmly walked the aisle of the plane to be sure that everyone was out before joining the 150 other rescued survivors (Levin, 2009; National Transportation Safety Board, 2009).[1]

Some called it "grace under pressure," and others the "miracle on the Hudson." But psychologists see it as the ultimate in *emotion regulation*—the ability to control and productively use one's emotions.

The topic of this chapter is affect, defined as *the experience of feeling or emotion*. Affect is an essential part of the study of psychology because it plays such an important role in everyday life.

As we will see, affect guides behavior, helps us make decisions, and has a major impact on our mental and physical health.

The two fundamental components of affect are *emotions* and *motivation*. Both of these words have the same underlying Latin root, meaning "to move." In contrast to cognitive processes that are calm, collected, and frequently rational, emotions and motivations involve arousal, or *our experiences of the bodily responses created by the sympathetic division of the autonomic nervous system (ANS).* Because they involve arousal, emotions and motivations are "hot"—they "charge," "drive," or "move" our behavior.

When we experience emotions or strong motivations, we *feel* the experiences. When we become aroused, the sympathetic nervous system provides us with energy to respond to our environment. The liver puts extra sugar into the bloodstream, the heart pumps more blood, our pupils dilate to help us see better, respiration increases, and we begin to perspire to cool the body. The stress hormones *epinephrine* and *norepinephrine* are released. We experience these responses as arousal.

An emotion is *a mental and physiological feeling state that directs our attention and guides our behavior*. Whether it is the thrill of a roller-coaster ride that elicits an unexpected scream, the flush of embarrassment that follows a public mistake, or the horror of a potential plane crash that creates an exceptionally brilliant response in a pilot, emotions move our actions. Emotions normally serve an adaptive role: We care for infants because of the love we feel for them, we avoid making a left turn onto a crowded highway because we fear that a speeding truck may hit us, and we are particularly nice to Mandy because we are feeling guilty that we didn't go to her party. But emotions may also be destructive, such as when a frustrating experience leads us to lash out at others who do not deserve it.

Motivations are closely related to emotions. A motivation is *a driving force that initiates and directs behavior*. Some motivations are biological, such as the motivation for food, water, and sex. But there are a variety of other personal and social motivations that can influence behavior, including the motivations for social approval and acceptance, the motivation to achieve, and the motivation to take, or to avoid taking, risks (Morsella, Bargh, & Gollwitzer, 2009). [2] In each

case we follow our motivations because they are rewarding. As predicted by basic theories of operant learning, motivations lead us to engage in particular behaviors because doing so makes us feel good.

Motivations are often considered in psychology in terms of *drives*, which are internal states that are activated when the physiological characteristics of the body are out of balance, and *goals*, which are desired end states that we strive to attain. Motivation can thus be conceptualized as a series of behavioral responses that lead us to attempt to reduce drives and to attain goals by comparing our current state with a desired end state (Lawrence, Carver, & Scheier, 2002). [3] Like a thermostat on an air conditioner, the body tries to maintain *homeostasis*, the natural state of the body's systems, with goals, drives, and arousal in balance. When a drive or goal is aroused—for instance, when we are hungry—the thermostat turns on and we start to behave in a way that attempts to reduce the drive or meet the goal (in this case to seek food). As the body works toward the desired end state, the thermostat continues to check whether or not the end state has been reached. Eventually, the need or goal is satisfied (we eat), and the relevant behaviors are turned off. The body's thermostat continues to check for homeostasis and is always ready to react to future needs.

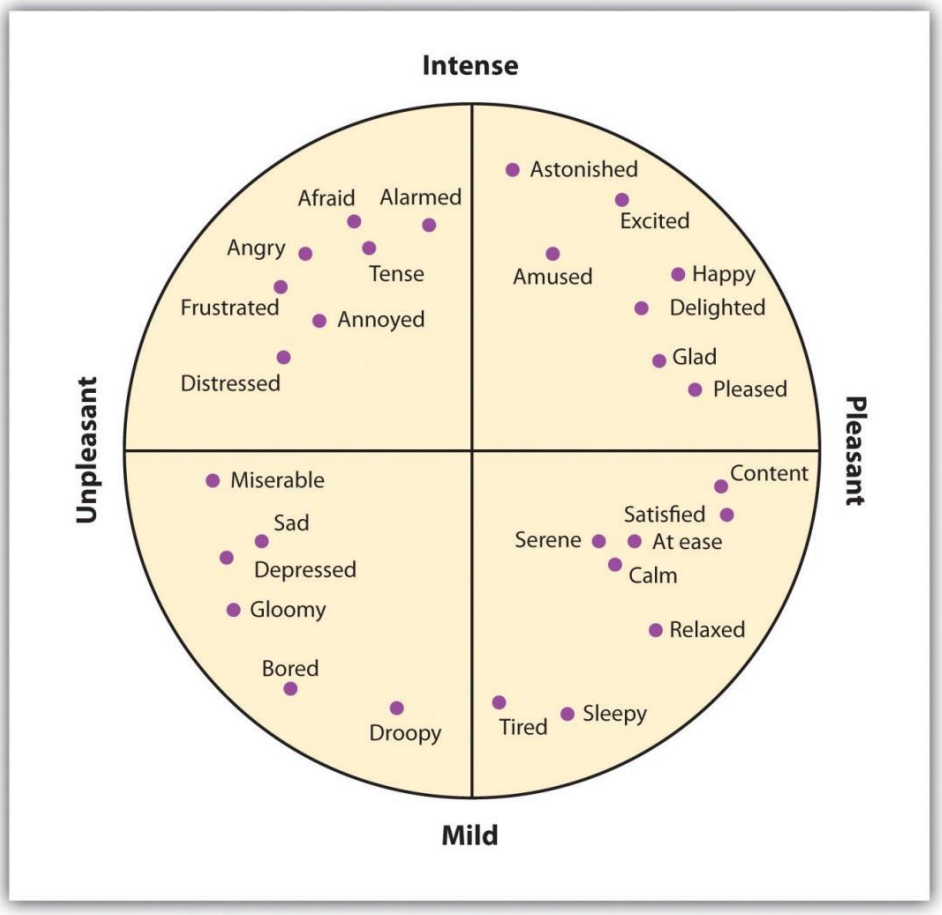
In addition to more basic motivations such as hunger, a variety of other personal and social motivations can also be conceptualized in terms of drives or goals. When the goal of studying for an exam is hindered because we take a day off from our schoolwork, we may work harder on our studying on the next day to move us toward our goal. When we are dieting, we may be more likely to have a big binge on a day when the scale says that we have met our prior day's goals. And when we are lonely, the motivation to be around other people is aroused and we try to socialize. In many, if not most cases, our emotions and motivations operate out of our conscious awareness to guide our behavior (Freud, 1922; Hassin, Bargh, & Zimerman, 2009; Williams, Bargh, Nocera, & Gray, 2009). [4]

The most fundamental emotions, known as the basic emotions, are those of*anger, disgust, fear, happiness, sadness, and surprise*. The basic emotions have a long history in human evolution, and they have developed in large part to help us make rapid judgments about stimuli and to

quickly guide appropriate behavior (LeDoux, 2000).[1] The basic emotions are determined in large part by one of the oldest parts of our brain, the limbic system, including the amygdala, the hypothalamus, and the thalamus. Because they are primarily evolutionarily determined, the basic emotions are experienced and displayed in much the same way across cultures (Ekman, 1992; Elfenbein & Ambady, 2002, 2003; Fridland, Ekman, & Oster, 1987),[2] and people are quite accurate at judging the facial expressions of people from different cultures. View Note 10.8 "Video Clip: The Basic Emotions" to see a demonstration of the basic emotions.

Not all of our emotions come from the old parts of our brain; we also interpret our experiences to create a more complex array of emotional experiences. For instance, the amygdala may sense fear when it senses that the body is falling, but that fear may be interpreted completely differently (perhaps even as “excitement”) when we are falling on a roller-coaster ride than when we are falling from the sky in an airplane that has lost power. The *cognitive interpretations that accompany emotions*—known as cognitive appraisal—allow us to experience a much larger and more complex set of *secondary emotions*, as shown in Figure 10.2 "The Secondary Emotions". Although they are in large part cognitive, our experiences of the secondary emotions are determined in part by arousal (on the vertical axis of Figure 10.2 "The Secondary Emotions") and in part by their *valence*—that is, whether they are pleasant or unpleasant feelings (on the horizontal axis of Figure 10.2 "The Secondary Emotions")

Figure 10.2 *The Secondary Emotions*



The secondary emotions are those that have a major cognitive component. They are determined by both their level of arousal (low to high) and their valence (pleasant to unpleasant).

Source: Adapted from Russell, J. A. (1980). A circumplex model of affect.Journal of Personality and Social Psychology, 39, 1161–1178.

When you succeed in reaching an important goal, you might spend some time enjoying your secondary emotions, perhaps the experience of joy, satisfaction, and contentment. But when your close friend wins a prize that you thought you had deserved, you might also experience a variety of secondary emotions (in this case, the negative ones)—for instance, feeling angry, sad, resentful, and ashamed. You might mull over the event for weeks or even months, experiencing these negative emotions each time you think about it (Martin & Tesser, 2006).[3]

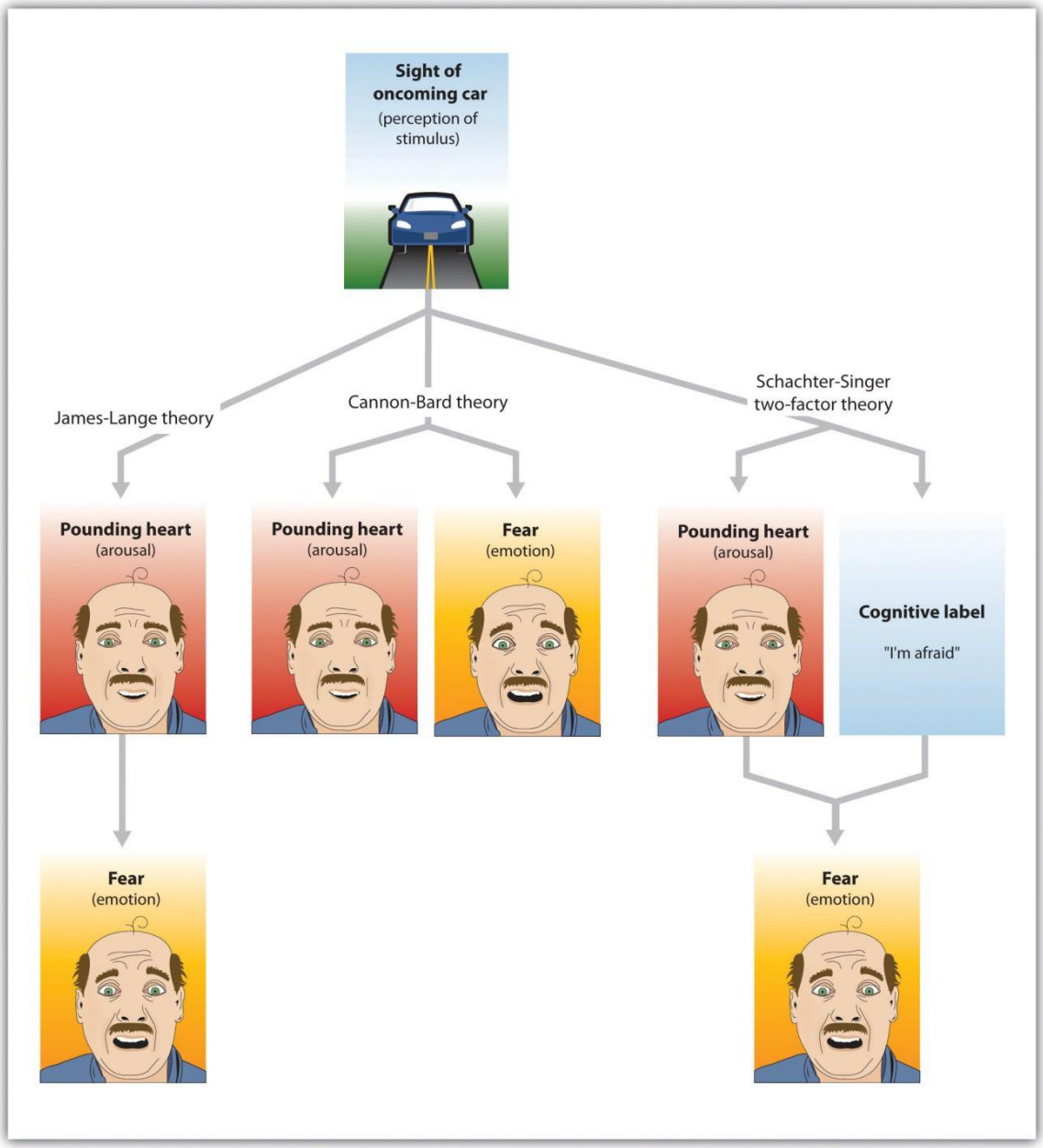
The distinction between the primary and the secondary emotions is paralleled by two brain pathways: a fast pathway and a slow pathway (Damasio, 2000; LeDoux, 2000; Ochsner, Bunge, Gross, & Gabrielli, 2002).[4] The thalamus acts as the major gatekeeper in this process (Figure 10.3 "Slow and Fast Emotional Pathways"). Our response to the basic emotion of fear, for instance, is primarily determined by the fast pathway through the limbic system. When a car pulls out in front of us on the highway, the thalamus activates and sends an immediate message to the amygdala. We quickly move our foot to the brake pedal. Secondary emotions are more determined by the slow pathway through the frontal lobes in the cortex. When we stew in jealousy over the loss of a partner to a rival or recollect on our win in the big tennis match, the process is more complex. Information moves from the thalamus to the frontal lobes for cognitive analysis and integration, and then from there to the amygdala. We experience the arousal of emotion, but it is accompanied by a more complex cognitive appraisal, producing more refined emotions and behavioral responses.

The Cannon-Bard and James-Lange Theories of Emotion

Recall for a moment a situation in which you have experienced an intense emotional response. Perhaps you woke up in the middle of the night in a panic because you heard a noise that made you think that someone had broken into your house or apartment. Or maybe you were calmly cruising down a street in your neighborhood when another car suddenly pulled out in front of you, forcing you to slam on your brakes to avoid an accident. I'm sure that you remember that your emotional reaction was in large part physical. Perhaps you remember being flushed, your heart pounding, feeling sick to your stomach, or having trouble breathing. You were experiencing the physiological part of emotion—arousal—and I'm sure you have had similar feelings in other situations, perhaps when you were in love, angry, embarrassed, frustrated, or very sad.

If you think back to a strong emotional experience, you might wonder about the order of the events that occurred. Certainly you experienced arousal, but did the arousal come before, after, or along with the experience of the emotion? Psychologists have proposed three different theories of emotion, which differ in terms of the hypothesized role of arousal in emotion (Figure 10.4 "Three Theories of Emotion").

Figure 10.4 *Three Theories of Emotion*



The Cannon-Bard theory proposes that emotions and arousal occur at the same time. The James-Lange theory proposes the emotion is the result of arousal. Schachter and Singer's two-factor model proposes that arousal and cognition combine to create emotion.

If your experiences are like mine, as you reflected on the arousal that you have experienced in strong emotional situations, you probably thought something like, "I was afraid and my heart started beating like crazy." At least some psychologists agree with this interpretation. According to the theory of emotion proposed by Walter Cannon and Philip Bard, the experience of the emotion (in this case, "I'm afraid") occurs alongside our experience of the arousal ("my heart is beating fast"). According to the Cannon-Bard theory of emotion, *the experience of an emotion is accompanied by physiological arousal*. Thus, according to this model of emotion, as we become aware of danger, our heart rate also increases.

Although the idea that the experience of an emotion occurs alongside the accompanying arousal seems intuitive to our everyday experiences, the psychologists William James and Carl Lange had another idea about the role of arousal. According to the James-Lange theory of emotion, *our experience of an emotion is the result of the arousal that we experience*. This approach proposes that the arousal and the emotion are not independent, but rather that the emotion depends on the arousal. The fear does not occur along with the racing heart but occurs *because of* the racing heart. As William James put it, "We feel sorry because we cry, angry because we strike, afraid because we tremble" (James, 1884, p. 190).[5] A fundamental aspect of the James-Lange theory is that different patterns of arousal may create different emotional experiences.

There is research evidence to support each of these theories. The operation of the fast emotional pathway (Figure 10.3 "Slow and Fast Emotional Pathways") supports the idea that arousal and emotions occur together. The emotional circuits in the limbic system are activated when an emotional stimulus is experienced, and these circuits quickly create corresponding physical reactions (LeDoux, 2000).[6] The process happens so quickly that it may feel to us as if emotion is simultaneous with our physical arousal.

On the other hand, and as predicted by the James-Lange theory, our experiences of emotion are weaker without arousal. Patients who have spinal injuries that reduce their experience of arousal also report decreases in emotional responses (Hohmann, 1966).[7] There is also at least some support for the idea that different emotions are produced by different patterns of arousal. People who view fearful faces show more amygdala activation than those who watch angry or joyful faces (Whalen et al., 2001; Witvliet & Vrana, 1995),[8] we experience a red face and flushing

when we are embarrassed but not when we experience other emotions (Leary, Britt, Cutlip, & Templeton, 1992), [9] and different hormones are released when we experience compassion than when we experience other emotions (Oatley, Keltner, & Jenkins, 2006). [10]

The Two-Factor Theory of Emotion

Whereas the James-Lange theory proposes that each emotion has a different pattern of arousal, the *two-factor theory* of emotion takes the opposite approach, arguing that the arousal that we experience is basically the same in every emotion, and that all emotions (including the basic emotions) are differentiated only by our cognitive appraisal of the source of the arousal. The two-factor theory of emotion asserts that *the experience of emotion is determined by the intensity of the arousal we are experiencing, but that the cognitive appraisal of the situation determines what the emotion will be*. Because both arousal and appraisal are necessary, we can say that emotions have two factors: an arousal factor and a cognitive factor (Schachter & Singer, 1962): [11]

emotion = arousal + cognition

In some cases it may be difficult for a person who is experiencing a high level of arousal to accurately determine which emotion she is experiencing. That is, she may be certain that she is feeling arousal, but the meaning of the arousal (the cognitive factor) may be less clear. Some romantic relationships, for instance, have a very high level of arousal, and the partners alternatively experience extreme highs and lows in the relationship. One day they are madly in love with each other and the next they are in a huge fight. In situations that are accompanied by high arousal, people may be unsure what emotion they are experiencing. In the high arousal relationship, for instance, the partners may be uncertain whether the emotion they are feeling is love, hate, or both at the same time (sound familiar?). *The tendency for people to incorrectly label the source of the arousal that they are experiencing* is known as the misattribution of arousal.

Communicating Emotion

In addition to experiencing emotions internally, we also express our emotions to others, and we learn about the emotions of others by observing them. This communication process has evolved over time, and is highly adaptive. One way that we perceive the emotions of others is through

theirnonverbal communication, that is, *communication that does not involve words* (Ambady & Weisbuch, 2010; Anderson, 2007). [12] Nonverbal communication includes our tone of voice, gait, posture, touch, and facial expressions, and we can often accurately detect the emotions that other people are experiencing through these channels. Table 10.1 "Some Common Nonverbal Communicators" shows some of the important nonverbal behaviors that we use to express emotion and some other information (particularly liking or disliking, and dominance or submission).

Table 10.1 Some Common Nonverbal Communicators

Nonverbal cue	Description	Examples
Proxemics	Rules about the appropriate use of personal space	Standing nearer to someone can expressing liking or dominance.
Body appearance	Expressions based on alterations to our body	Body building, breast augmentation, weight loss, piercings, and tattoos are often used to appear more attractive to others.
Body positioning and movement	Expressions based on how our body appears	A more "open" body position can denote liking; a faster walking speed can communicate dominance.
Gestures	Behaviors and signs made with our hands or faces	The peace sign communicates liking; the "finger" communicates disrespect.
Facial expressions	The variety of emotions that we express, or attempt to hide, through our face	Smiling or frowning and staring or avoiding looking at the other can express liking or disliking, as well as dominance or submission.
Paralanguage	Clues to identity or emotions contained in our voices	Pronunciation, accents, and dialect can be used to communicate identity and liking.

Just as there is no "universal" spoken language, there is no universal nonverbal language. For instance, in the United States and many Western cultures we express disrespect by showing the middle finger (the "finger" or the "bird"). But in Britain, Ireland, Australia and New Zealand, the "V" sign (made with back of the hand facing the recipient) serves a similar purpose. In countries where Spanish, Portuguese, or French are spoken, a gesture in which a fist is raised and the arm is slapped on the bicep is equivalent to the finger, and in Russia, Indonesia, Turkey, and China a sign in which the hand and fingers are curled and the thumb is thrust between the middle and index fingers is used for the same purpose.

The most important communicator of emotion is the face. The face contains 43 different muscles that allow it to make more than 10,000 unique configurations and to express a wide variety of emotions. For example, happiness is expressed by smiles, which are created by two of the major muscles surrounding the mouth and the eyes, and anger is created by lowered brows and firmly pressed lips.

In addition to helping us express our emotions, the face also helps us feel emotion. The facial feedback hypothesis proposes that *the movement of our facial muscles can trigger corresponding emotions*. Fritz Strack and his colleagues (1988)[13] asked their research participants to hold a pen in their teeth (mimicking the facial action of a smile) or between their lips (similar to a frown), and then had them rate the funniness of a cartoon. They found that the cartoons were rated as more amusing when the pen was held in the "smiling" position—the subjective experience of emotion was intensified by the action of the facial muscles.

These results, and others like them, show that our behaviors, including our facial expressions, are influenced by, but also influence our affect. We may smile because we are happy, but we are also happy because we are smiling. And we may stand up straight because we are proud, but we are proud because we are standing up straight (Stepper & Strack, 1993).[14]

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10.2 Positive Emotions: The Power of Happiness

You have probably heard about the "power of positive thinking"—the idea that thinking positively helps people meet their goals and keeps them healthy, happy, and able to effectively cope with the negative events that occur to them. It turns out that positive thinking really works. People who think positively about their future, who believe that they can control their outcomes, and who are willing to open up and share with others are healthier people (Seligman, & Csikszentmihalyi, 2000). [1]

The power of positive thinking comes in different forms, but they are all helpful. Some researchers have focused on optimism, *a general tendency to expect positive outcomes*, finding that optimists are happier and have less stress (Carver & Scheier, 2009). [2] Others have focused self-efficacy, *the belief in our ability to carry out actions that produce desired outcomes*. People with high self-efficacy respond to environmental and other threats in an active, constructive way—by getting information, talking to friends, and attempting to face and reduce the difficulties they are experiencing. These people too are better able to ward off their stresses in comparison to people with less self-efficacy (Thompson, 2009). [3]

Self-efficacy helps in part because it leads us to perceive that we can control the potential stressors that may affect us. Workers who have control over their work environment (e.g., by being able to move furniture and control distractions) experience less stress, as do patients in nursing homes who are able to choose their everyday activities (Rodin, 1986). [4] Glass, Reim, and Singer (1971) [5] found that participants who believed that they could stop a loud noise experienced less stress than those who did not think that they could, even though the people who had the option never actually used it. The ability to control our outcomes may help explain why animals and people who have higher status live longer (Sapolsky, 2005). [6]

Finding Happiness Through Our Connections With Others

Happiness is determined in part by genetic factors, such that some people are naturally happier than others (Braungart, Plomin, DeFries, & Fulker, 1992; Lykken, 2000), [7] but also in part by the situations that we create for ourselves. Psychologists have studied hundreds of variables that influence happiness, but there is one that is by far the most important. People who report that

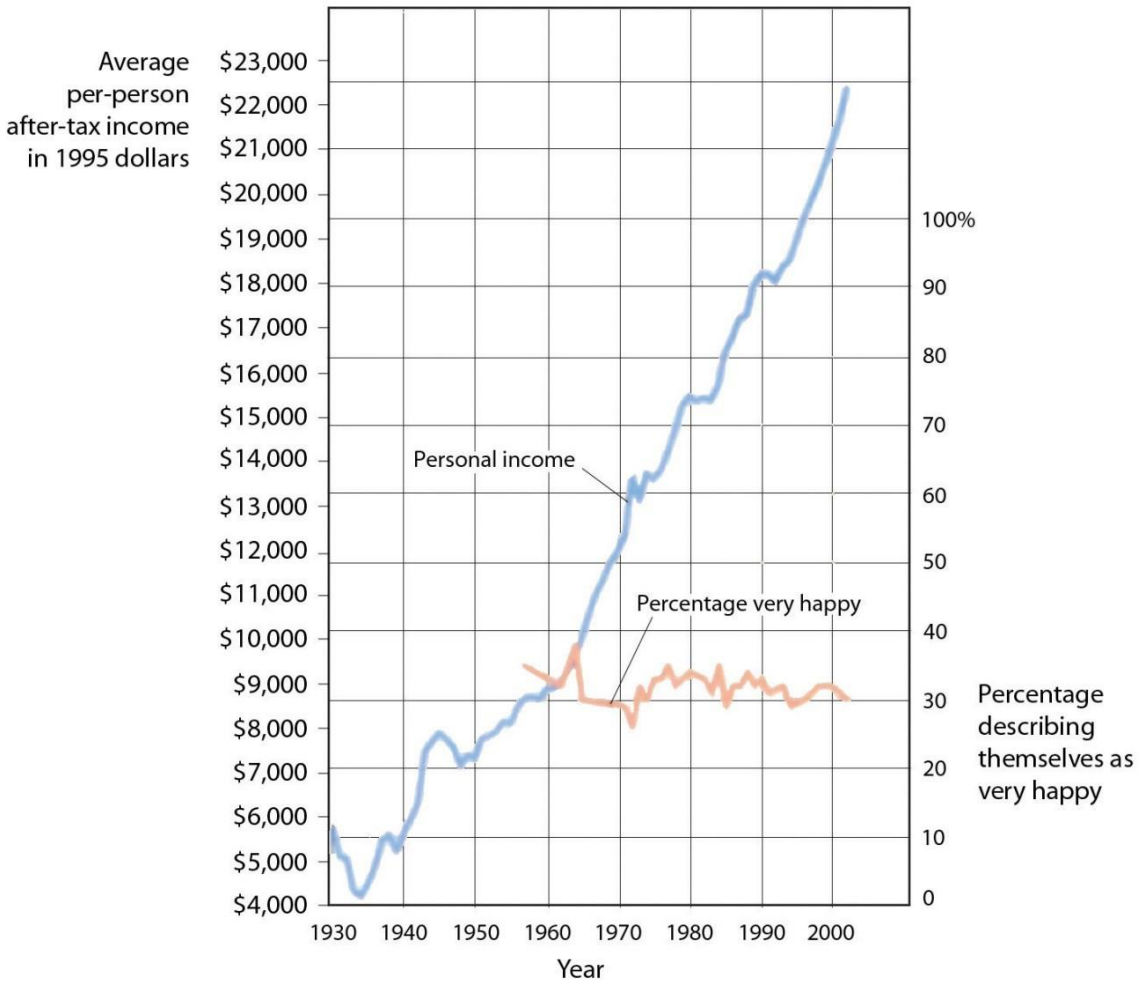
they *have positive social relationships with others*—the perception ofsocial support—also report being happier than those who report having less social support (Diener, Suh, Lucas, & Smith, 1999; Diener, Tamir, & Scollon, 2006).[8] Married people report being happier than unmarried people (Pew, 2006),[9] and people who are connected with and accepted by others suffer less depression, higher self-esteem, and less social anxiety and jealousy than those who feel more isolated and rejected (Leary, 1990).[10]

Social support also helps us better cope with stressors. Koopman, Hermanson, Diamond, Angell, and Spiegel (1998)[11] found that women who reported higher social support experienced less depression when adjusting to a diagnosis of cancer, and Ashton et al. (2005)[12] found a similar buffering effect of social support for AIDS patients. People with social support are less depressed overall, recover faster from negative events, and are less likely to commit suicide (Au, Lau, & Lee, 2009; Bertera, 2007; Compton, Thompson, & Kaslow, 2005; Skärsäter, Langius, Ågren, Häagström, & Dencker, 2005).[13]

What Makes Us Happy?

One difficulty that people face when trying to improve their happiness is that they may not always know what will make them happy. As one example, many of us think that if we just had more money we would be happier. While it is true that we do need money to afford food and adequate shelter for ourselves and our families, after this minimum level of wealth is reached, more money does not generally buy more happiness (Easterlin, 2005).[14] For instance, as you can see in, even though income and material success has improved dramatically in many countries over the past decades, happiness has not. Despite tremendous economic growth in France, Japan, and the United States between 1946 to 1990, there was no increase in reports of well-being by the citizens of these countries. Americans today have about three times the buying power they had in the 1950s, and yet overall happiness has not increased. The problem seems to be that we never seem to have enough money to make us "really" happy. Csikszentmihalyi (1999)[15] reported that people who earned $30,000 per year felt that they would be happier if they made $50,000 per year, but that people who earned $100,000 per year said that they would need $250,000 per year to make them happy.

Figure 10.11 *Income and Happiness*



Although personal income keeps rising, happiness does not.

Source: Layard, R. (2005). Happiness: Lessons from a new science. New York, NY: Penguin.

These findings might lead us to conclude that we don't always know what does or what might make us happy, and this seems to be at least partially true. For instance, Jean Twenge and her colleagues (Twenge, Campbell & Foster, 2003)[16] have found in several studies that although people with children frequently claim that having children makes them happy, couples who do not have children actually report being happier than those who do.

Psychologists have found that people's ability to predict their future emotional states is not very accurate (Wilson & Gilbert, 2005).[17] For one, people overestimate their emotional reactions to

events. Although people think that positive and negative events that might occur to them will make a huge difference in their lives, and although these changes do make at least some difference in life satisfaction, they tend to be less influential than we think they are going to be. Positive events tend to make us feel good, but their effects wear off pretty quickly, and the same is true for negative events. For instance, Brickman, Coates, and Janoff-Bulman (1978) [18] interviewed people who had won more than $50,000 in a lottery and found that they were not happier than they had been in the past, and were also not happier than a control group of similar people who had not won the lottery. On the other hand, the researchers found that individuals who were paralyzed as a result of accidents were not as unhappy as might be expected.

How can this possibly be? There are several reasons. For one, people are resilient; they bring their coping skills to play when negative events occur, and this makes them feel better. Secondly, most people do not continually experience very positive, or very negative, affect over a long period of time, but rather adapt to their current circumstances. Just as we enjoy the second chocolate bar we eat less than we enjoy the first, as we experience more and more positive outcomes in our daily lives we habituate to them and our life satisfaction returns to a more moderate level (Small, Zatorre, Dagher, Evans, & Jones-Gotman, 2001). [19]

Taken together, it has been estimated that our wealth, health, and life circumstances account for only 15% to 20% of life satisfaction scores (Argyle, 1999). [20] Clearly the main ingredient in happiness lies beyond, or perhaps beneath, external factors.

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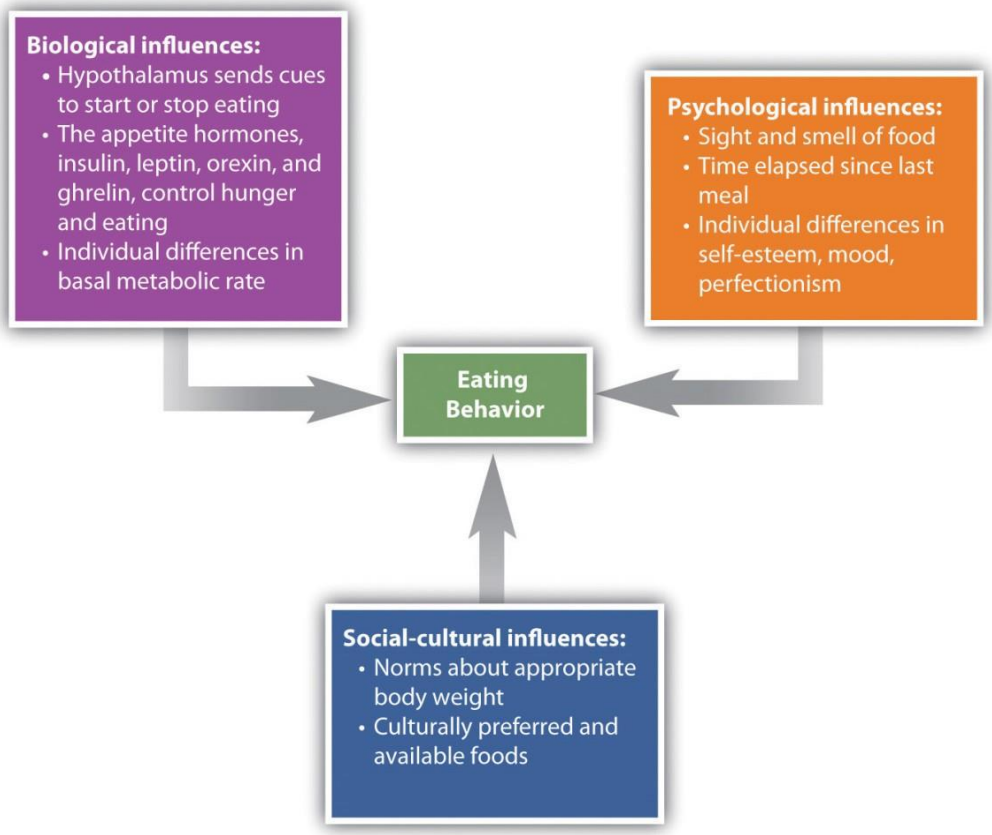
10.3 Two Fundamental Human Motivations: Eating and Mating

More than 1 in 10 U.S. households contain people who live without enough nourishing food, and this lack of proper nourishment has profound effects on their abilities to create effective lives (Hunger Notes, n.d.).[1] When people are extremely hungry, their motivation to attain food completely changes their behavior. Hungry people become listless and apathetic to save energy and then become completely obsessed with food. Ancel Keys and his colleagues (Keys, Brožek, Henschel, Mickelsen, & Taylor, 1950)[2] found that volunteers who were placed on severely reduced-calorie diets lost all interest in sex and social activities, becoming preoccupied with food.

Like most interesting psychological phenomena, the simple behavior of eating has both biological and social determinants (Figure 10.12 "Biological, Psychological, and Social-Cultural Contributors to Eating"). Biologically, hunger is controlled by the interactions among complex pathways in the nervous system and a variety of hormonal and chemical systems in the brain and body. The stomach is of course important. We feel more hungry when our stomach is empty than when it is full. But we can also feel hunger even without input from the stomach. Two areas of the hypothalamus are known to be particularly important in eating. The lateral part of the hypothalamus responds primarily to cues to start eating, whereas the ventromedial part of the

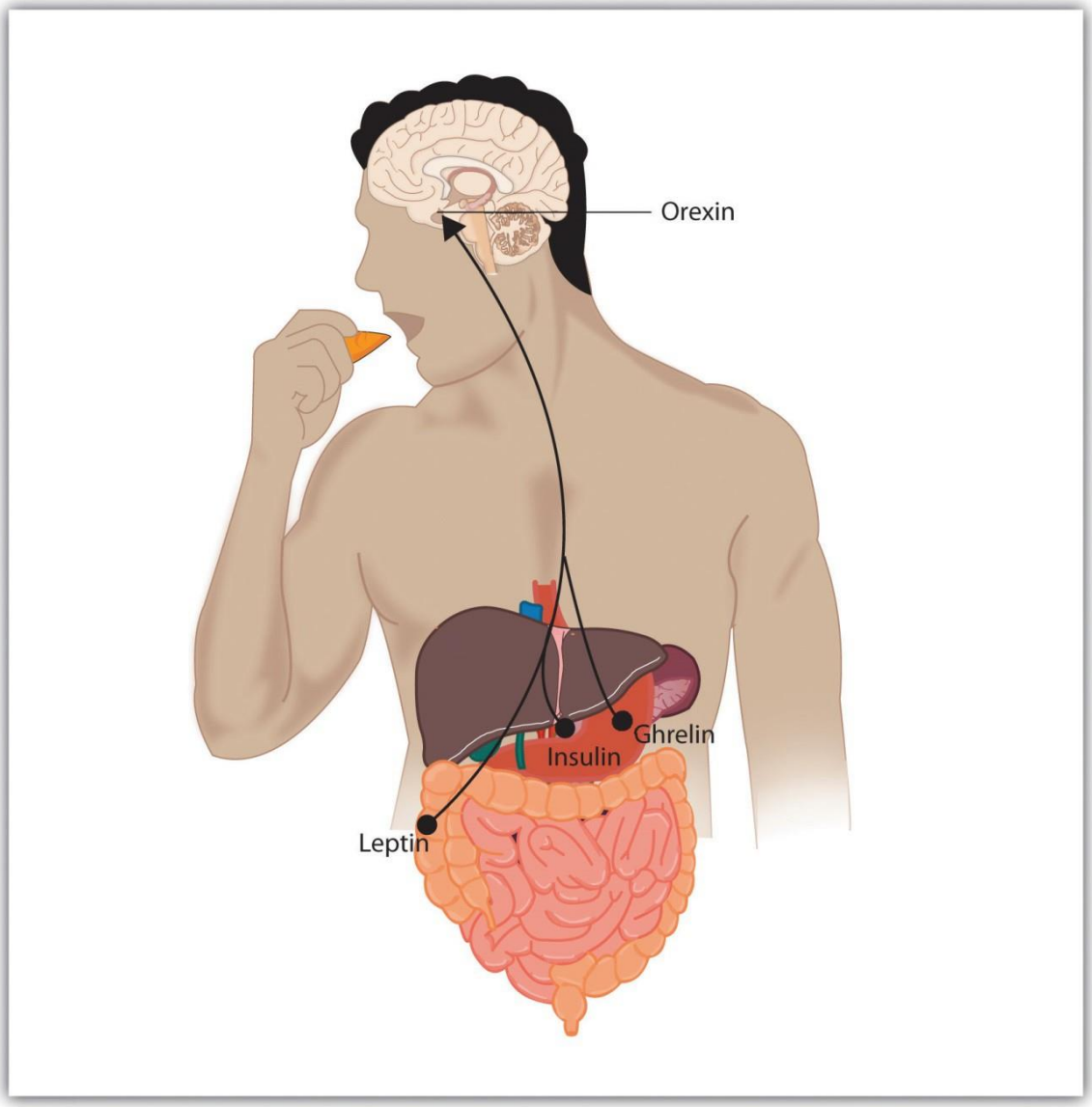
hypothalamus primarily responds to cues to stop eating. If the lateral part of the hypothalamus is damaged, the animal will not eat even if food is present, whereas if the ventromedial part of the hypothalamus is damaged, the animal will eat until it is obese (Wolf & Miller, 1964).[3]

Figure 10.12 *Biological, Psychological, and Social-Cultural Contributors to Eating*



Hunger is also determined by hormone levels (Figure 10.13 "Eating Is Influenced by the Appetite Hormones"). *Glucose* is the main sugar that the body uses for energy, and the brain monitors blood glucose levels to determine hunger. Glucose levels in the bloodstream are regulated by *insulin*, a hormone secreted by the pancreas gland. When insulin is low, glucose is not taken up by body cells, and the body begins to use fat as an energy source. Eating and appetite are also influenced by other hormones, including *orexin*, *ghrelin*, and*leptin* (Brennan & Mantzoros, 2006; Nakazato et al., 2001).[4]

Figure 10.13 *Eating Is Influenced by the Appetite Hormones*



Insulin, secreted by the pancreas, controls blood glucose; leptin, secreted by fat cells, monitors energy levels; orexin, secreted by the hypothalamus, triggers hunger; ghrelin, secreted by an empty stomach, increases food intake.

Normally the interaction of the various systems that determine hunger creates a balance or *homeostasis* in which we eat when we are hungry and stop eating when we feel full. But homeostasis varies among people; some people simply weigh more than others, and there is little they can do to change their fundamental weight. Weight is determined in large part by

thebasal metabolic rate, *the amount of energy expended while at rest*. Each person's basal metabolic rate is different, due to his or her unique physical makeup and physical behavior. A naturally occurring low metabolic rate, which is determined entirely by genetics, makes weight management a very difficult undertaking for many people.

How we eat is also influenced by our environment. When researchers rigged clocks to move faster, people got hungrier and ate more, as if they thought they must be hungry again because so much time had passed since they last ate (Schachter, 1968).[5] And if we forget that we have already eaten, we are likely to eat again even if we are not actually hungry (Rozin, Dow, Moscovitch, & Rajaram, 1998).[6]

Cultural norms about appropriate weights also influence eating behaviors. Current norms for women in Western societies are based on a very thin body ideal, emphasized by television and movie actresses, models, and even children's dolls, such as the ever-popular Barbie.

Obesity

Although some people eat too little, eating too much is also a major problem. Obesity is *a medical condition in which so much excess body fat has accumulated in the body that it begins to have an adverse impact on health*. In addition to causing people to be stereotyped and treated less positively by others (Crandall, Merman, & Hebl, 2009),[7]uncontrolled obesity leads to health problems including cardiovascular disease, diabetes, sleep apnea, arthritis, Alzheimer's disease, and some types of cancer (Gustafson, Rothenberg, Blennow, Steen, & Skoog, 2003).[8]Obesity also reduces life expectancy (Haslam & James, 2005).[9]

Obesity is determined by calculating the *body mass index (BMI)*, a measurement that compares one's weight and height. People are defined as overweight when their BMI is greater than 25 kg/m^2 and as obese when it is greater than 30 kg/m^2. If you know your height and weight, you can go tohttp://www.nhlbisupport.com/bmi to calculate your BMI.

Obesity is a leading cause of death worldwide. Its prevalence is rapidly increasing, and it is one of the most serious public health problems of the 21st century. Although obesity is caused in part by genetics, it is increased by overeating and a lack of physical activity (Nestle & Jacobson, 2000; James, 2008).[10]

There are really only two approaches to controlling weight: eat less and exercise more. Dieting is difficult for anyone, but it is particularly difficult for people with slow basal metabolic rates, who must cope with severe hunger to lose weight. Although most weight loss can be maintained for about a year, very few people are able to maintain substantial weight loss through dieting alone for more than three years (Miller, 1999).[11] Substantial weight loss of more than 50 pounds is typically seen only when weight loss surgery has been performed (Douketis, Macie, Thabane, & Williamson, 2005).[12] Weight loss surgery reduces stomach volume or bowel length, leading to earlier satiation and reduced ability to absorb nutrients from food.

A recent report found that only about one-half of Americans perform the 30 minutes of exercise 5 times a week that the Centers for Disease Control and Prevention suggests as the minimum healthy amount (Centers for Disease Control and Prevention, 2007).[13] As for the other half of Americans, they most likely are listening to the guidelines, but they are unable to stick to the regimen. Almost half of the people who start an exercise regimen give it up by the 6-month mark (American Heart Association, 1998).[14] This is a problem, given that exercise has long-term benefits only if it is continued.

Sex: The Most Important Human Behavior

Perhaps the most important aspect of human experience is the process of reproduction. Without it, none of us would be here. Successful reproduction in humans involves the coordination of a wide variety of behaviors, including courtship, sex, household arrangements, parenting, and child care.

The Experience of Sex

The sexual drive, with its reward of intense pleasure in orgasm, is highly motivating. The biology of the sexual response was studied in detail by Masters and Johnson (1966),[15] who monitored or filmed more than 700 men and women while they masturbated or had intercourse. Masters and Johnson found that the sexual response cycle—*the biological sexual response in humans*—was very similar in men and women, and consisted of four stages:

Excitement. The genital areas become engorged with blood. Women's breasts and nipples may enlarge and the vagina expands and secretes lubricant.

Plateau. Breathing, pulse, and blood pressure increase as orgasm feels imminent. The penis becomes fully enlarged. Vaginal secretions continue and the clitoris may retract.

Orgasm. Muscular contractions occur throughout the body, but particularly in the genitals. The spasmodic ejaculations of sperm are similar to the spasmodic contractions of vaginal walls, and the experience of orgasm is similar for men and women. The woman's orgasm helps position the uterus to draw sperm inward (Thornhill & Gangestad, 1995).[16]

Resolution. After orgasm the body gradually returns to its prearoused state. After one orgasm, men typically experience a *refractory period*, in which they are incapable of reaching another orgasm for several minutes, hours, or even longer. Women may achieve several orgasms before entering the resolution stage.

The sexual response cycle and sexual desire are regulated by the sex hormones *estrogen* in women and *testosterone* in both women and in men. Although the hormones are secreted by the ovaries and testes, it is the hypothalamus and the pituitary glands that control the process.

Estrogen levels in women vary across the menstrual cycle, peaking during ovulation (Pillsworth, Haselton, & Buss, 2004).[17] Women are more interested in having sex during ovulation but can experience high levels of sexual arousal throughout the menstrual cycle.

In men, testosterone is essential to maintain sexual desire and to sustain an erection, and testosterone injections can increase sexual interest and performance (Aversa et al., 2000; Jockenhövel et al., 2009).[18] Testosterone is also important in the female sex cycle. Women who are experiencing menopause may develop a loss of interest in sex, but this interest may be rekindled through estrogen and testosterone replacement treatments (Meston & Frohlich, 2000).[19]

Although their biological determinants and experiences of sex are similar, men and women differ substantially in their overall interest in sex, the frequency of their sexual activities, and the mates they are most interested in. Men show a more consistent interest in sex, whereas the sexual desires of women are more likely to vary over time (Baumeister, 2000).[20] Men fantasize about sex more often than women, and their fantasies are more physical and less intimate (Leitenberg

& Henning, 1995).[21] Men are also more willing to have casual sex than are women, and their standards for sex partners is lower (Petersen & Hyde, 2010; Saad, Eba, & Sejean, 2009).[22]

Gender differences in sexual interest probably occur in part as a result of the evolutionary predispositions of men and women, and this interpretation is bolstered by the finding that gender differences in sexual interest are observed cross-culturally (Buss, 1989).[23] Evolutionarily, women should be more selective than men in their choices of sex partners because they must invest more time in bearing and nurturing their children than do men (most men do help out, of course, but women simply do more [Buss & Kenrick, 1998]).[24]Because they do not need to invest a lot of time in child rearing, men may be evolutionarily predisposed to be more willing and desiring of having sex with many different partners and may be less selective in their choice of mates. Women, on the other hand, because they must invest substantial effort in raising each child, should be more selective.

The Many Varieties of Sexual Behavior

Sex researchers have found that sexual behavior varies widely, not only between men and women but within each sex (Kinsey, Pomeroy, & Martin, 1948/1998; Kinsey, 1953/1998).[25] About a quarter of women report having a low sexual desire, and about 1% of people report feeling no sexual attraction whatsoever (Bogaert, 2004; Feldhaus-Dahir, 2009; West et al., 2008).[26]There are also people who experience hyperactive sexual drives. For about 3% to 6% of the population (mainly men), the sex drive is so strong that it dominates life experience and may lead to *hyperactive sexual desire disorder*(Kingston & Firestone, 2008).[27]

There is also variety in sexual orientation, which is *the direction of our sexual desire toward people of the opposite sex, people of the same sex, or people of both sexes*. The vast majority of human beings have a heterosexual orientation—their sexual desire is focused toward members of the opposite sex. A smaller minority is primarily homosexual (i.e., they have sexual desire for members of their own sex). Between 3% and 4% of men are gay, and between 1% and 2% of women are lesbian. Another 1% of the population reports being bisexual (having desires for both sexes). The love and sexual lives of homosexuals are little different from those of heterosexuals, except where their behaviors are constrained by cultural norms and local laws. As with heterosexuals, some gays and lesbians are celibate, some are promiscuous, but most are in committed, long-term relationships (Laumann, Gagnon, Michael, & Michaels, 1994).[28]

Although homosexuality has been practiced as long as records of human behavior have been kept, and occurs in many animals at least as frequently as it does in humans, cultures nevertheless vary substantially in their attitudes toward it. In Western societies such as the United States and Europe, attitudes are becoming progressively more tolerant of homosexuality, but it remains unacceptable in many other parts of the world. The American Psychiatric Association no longer considers homosexuality to be a "mental illness," although it did so until 1973. Because prejudice against gays and lesbians can lead to experiences of ostracism, depression, and even suicide (Kulkin, Chauvin, & Percle, 2000),[29] these improved attitudes can benefit the everyday lives of gays, lesbians, and bisexuals.

Whether sexual orientation is driven more by nature or by nurture has received a great deal of research attention, and research has found that sexual orientation is primarily biological (Mustanski, Chivers, & Bailey, 2002).[30] Areas of the hypothalamus are different in homosexual men, as well as in animals with homosexual tendencies, than they are in heterosexual members of the species, and these differences are in directions such that gay men are more similar to women than are straight men (Gladue, 1994; Lasco, Jordan, Edgar, Petito, & Byrne, 2002; Rahman & Wilson, 2003).[31] Twin studies also support the idea that there is a genetic component to sexual orientation. Among male identical twins, 52% of those with a gay brother also reported homosexuality, whereas the rate in fraternal twins was just 22% (Bailey et al., 1999; Pillard & Bailey, 1998).[32] There is also evidence that sexual orientation is influenced by exposure and responses to sex hormones (Hershberger & Segal, 2004; Williams & Pepitone, 2000).[33]

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