Unit VIII

Motivation, Emotion, and Stress

PD Unit Overview

Behavior occurs every day, and motivations and emotions underlie each one. But what is motivation? And what are emotions? Though psychologists have developed theories, there is no real consensus on how motivation and emotions work. Motivations and emotions are complex, each involving an interplay of the psychological, physiological, and cognitive parts of ourselves. Consider any given behavior—going to school, falling in love, even waking up in the morning. What moves us to go to school, say yes to that first date, or drag ourselves out of bed in the morning? How do we feel about our classes, the date we had, or the promise of a new day? The answers are astoundingly complicated. Each person has his or her own reasons for and responses to their daily choices. This unit helps us understand how people arrive at the choices they make, and perhaps how to make even better choices in the future. After reading this unit, students will be able to:

- Understand how psychologists define motivation.
- Identify different perspectives on studying motivation.
- Describe the physiological factors that produce hunger.
- Analyze cultural and situational factors that influence hunger.
- Evaluate why some people become and remain obese.
- Describe the human sexual response cycle.
- Identify disruptions to the human sexual response cycle.
- Analyze how hormones and external and internal stimuli influence human sexual motivation.
- Analyze our need to belong.
- Describe how social networking influences people.
- Describe how arousal and expressive behaviors interact with emotions.
- Evaluate whether we can experience emotion without consciously acknowledging it.
- Relate the functions of the autonomic nervous system to emotional experiences and performance.
- Evaluate whether different emotions activate different physiological and brain-pattern responses.
- Analyze whether polygraphs detect deception.
- Describe how nonverbal behavior works.
- Discuss gender differences in nonverbal communication.
- Analyze how culture affects nonverbal communication.
- Analyze how facial expressions influence feelings.
- Identify events that provoke a stress response.
- Describe how we respond and adapt to stress.
- Analyze how stress makes us vulnerable to disease.
- Explain why some people are more susceptible to coronary artery disease.

Alignment to AP® Course Description

Topic 8: Motivation, Emotion, and Stress (6–8% of AP® Examination)

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**Unit Resources**

**Module 37**

**STUDENT ACTIVITIES**
- Fact or Falsehood?
- Purpose-in-Life Test
- Intrinsic Motivation and Achievement
- Sensation-Seeking Scale
- An Assessment of Your Present Needs
- A Short Measure of Self-Actualization

**FLIP IT VIDEO**
- Theories of Motivation

**Module 38**

**STUDENT ACTIVITIES**
- Fact or Falsehood?
- A Survey of Eating Habits
- A Week of Food

**FLIP IT VIDEO**
- The Hormones of Hunger

**Module 39**

**STUDENT ACTIVITY**
- Fact or Falsehood?

**Module 40**

**STUDENT ACTIVITY**
- Fact or Falsehood?

**Module 41**

**STUDENT ACTIVITIES**
- Fact or Falsehood?
- Brief Measures of Positive and Negative Affect: The PANAS Scales
- Using the GSR to Detect Deception

**FLIP IT VIDEO**
- General Adaptation Syndrome

**Module 42**

**STUDENT ACTIVITIES**
- Fact or Falsehood?
- Emotional Expressivity Scale
- The Affect Intensity Measure
- Nonverbal Communication
- The Affective Communication Test
- The Affect Grid
- Facial Feedback and the James–Lange Theory of Emotion

**FLIP IT VIDEO**
- Theories of Emotion

**Module 43**

**STUDENT ACTIVITIES**
- Fact or Falsehood?
- Hassles and Uplifts Scale
- Stress Symptoms

**FLIP IT VIDEO**
- General Adaptation Syndrome

**Module 44**

**STUDENT ACTIVITIES**
- Fact or Falsehood?
- Type A and Type B Personalities
- Hostility and Its Alleviation

**FLIP IT VIDEO**
- Type A and Type B
Aron Ralston understood how motivation can energize and direct behavior. Having tagged nearly all of Colorado’s tallest peaks, Ralston ventured some solo canyon hiking that seemed so risk-free he didn’t bother to tell anyone where he was going. In Utah’s narrow Bluejohn Canyon, just 150 yards above his final rappel, he was climbing over an 800-pound rock when disaster struck: It shifted and pinned his right wrist and arm. He was, as the title of his book says, caught Between a Rock and a Hard Place.

Realizing no one would be rescuing him, Ralston tried with all his might to dislodge the rock. Then, with a dull pocketknife, he tried chipping away at it. When that, too, failed, he rigged up ropes to lift the rock. Alas, nothing worked. Hour after hour, then cold night after cold night, he was stuck.

By Tuesday, he had run out of food and water. On Wednesday, as thirst and hunger gnawed, he began saving and sipping his own urine. Using his video recorder, he said good-bye to family and friends, for whom he now felt intense love: “So
Discussion Starter
Use the Module 37 Fact or Falsehood? activity from the TRM to introduce this module’s concepts.

Common Pitfalls
This unit covers content that may be controversial in some communities, so it’s important for you to help your students understand the science behind these topics. Guide students to use this information to make informed choices about their own behaviors.

Concept Connections
Motivation is closely tied to both neuroscience and cognition, studied in Units III and VII. Help students see the interplay between the 2 in motivation.

Flip It
Students can get additional help understanding the different theories of motivation by watching the Flip It Video: Theories of Motivation.

Motivation’s energizing and directing power. His intense emotional experiences of love and joy demonstrate the close ties between our feelings, or emotions, and our motivated behaviors. In this unit, we explore our motivations and emotions, and the health effects of intense or prolonged emotions such as anger and stress.

AP® Exam Tip
The introduction to Module 37 is important, because it informs you how the whole module is organized. Read it carefully now and perhaps return to it as a review when you are through with the module.

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Instincts and Evolutionary Psychology

Early in the twentieth century, as the influence of Charles Darwin's evolutionary theory grew, it became fashionable to classify all sorts of behaviors as instincts. If people criticized themselves, it was because of their "self-abasement instinct." If they boasted, it reflected their "self-assertion instinct." After scanning 500 books, one sociologist compiled a list of 5759 supposed human instincts! Before long, this fad for naming instincts collapsed under its own weight. Rather than explaining human behaviors, the early instinct theorists were simply naming them. It was like "explaining" a bright child's low grades by labeling the child an "underachiever." To name a behavior is not to explain it.

To qualify as an instinct, a complex behavior must have a fixed pattern throughout a species and be unlearned (Tinbergen, 1951). Such behaviors are common in other species (Module 26 described salmon returning to their birthplace, and Module 48 will describe imprinting in birds). Human behavior, too, exhibits certain unlearned fixed patterns, including infants' innate reflexes for rooting and sucking.

Although instinct theory failed to explain most human motives, evolutionary psychology's underlying assumption that genes predispose species-typical behavior remains as strong as ever. We saw this in Module 29's discussion of animals' biological predispositions to learn certain behaviors. And we will see this in later discussions of how evolution might influence our phobias, our helping behaviors, and our romantic attractions.

Drives and Incentives

When the original instinct theory of motivation collapsed, it was replaced by drive-reduction theory—the idea that a physiological need creates an aroused state that drives the organism to reduce the need by, say, eating or drinking. With few exceptions, when a physiological need increases, so does a psychological drive—acting to satisfy the need (Tinbergen, 1951). Human behavior, too, exhibits certain unlearned fixed patterns, including infants' innate reflexes for rooting and sucking.

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**Concept Connections**

Relate biological homeostasis to cognitive dissonance, the mental equivalent to homeostasis in which people seek a balance between their actions and attitudes (Unit XIV). While biological homeostasis focuses on physical conditions such as hunger, thirst, and temperature, cognitive homeostasis involves mental conditions such as consistency, balance, and harmony in one’s thinking—that is, seeking equity in the surrounding community, prioritizing one’s life, and promoting peace with the self and others.

**Common Pitfalls**

*Arousal and stimulation* are 2 words that will likely elicit giggles and chuckles from students of varying degrees of maturity. Help students see that these words can mean more than their popular connotations.

**AP® Exam Tip**

*Read carefully!* Homeostasis is not a motivation theory, but rather a biological principle that applies to some motivational theories (like drive-reduction).

**FYI**

Recall from Module 29 that we are also motivated by both intrinsic and extrinsic rewards.

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**Optimal Arousal**

We are much more than homeostatic systems, however. *Optimal arousal theory* holds that some motivated behaviors actually *increase* arousal. Well-fed animals will leave their shelter to explore and gain information, seemingly in the absence of any need-based drive. Curiosity drives monkeys to monkey around trying to figure out how to unlock a latch that opens nothing or how to open a window that allows them to see outside their room (Butler, 1954). It drives the 9-month-old infant to investigate every accessible corner of the house. It drives you to read this text, and it drives the scientists whose work this text discusses. And it drives explorers and adventurers such as Aron Ralston and George Mallory. Asked why he wanted to climb Mount Everest, the New York Times reported that Mallory answered, “Because it is there.” Those who, like Mallory and Ralston, enjoy high arousal are most likely to seek out intense music, novel foods, and risky behaviors (Zuckerman, 1979). They are “sensation-seekers.”

**Driven by curiosity** Baby monkeys and young children are fascinated by things they’ve never handled before. Their drive to explore the relatively unfamiliar is one of several motives that do not fill any immediate physiological need.

So, human motivation aims not to eliminate arousal but to seek optimum levels of arousal. Having all our biological needs satisfied, we feel driven to experience stimulation and we hunger for information. We are “infovores,” said neuroscientists Irving Biederman and Edward Vessel (2006), after identifying brain mechanisms that reward us for acquiring information. Lacking stimulation, we feel bored and look for a way to increase arousal to some optimum level. However, with too much stimulation comes stress, and we then look for a way to decrease arousal.

Two early-twentieth-century psychologists studied the relationship of arousal to performance and identified what we now call the *Yerkes-Dodson law*, suggesting that moderate arousal would lead to optimal performance (Yerkes & Dodson, 1908). When taking an exam, for example, it pays to be moderately aroused—alert but not trembling with nervousness. We have since learned that optimal arousal levels depend the task as well, with more difficult tasks requiring lower arousal for best performance (Hembree, 1988) (FIGURE 37.2).

**Enrichment**

Positive psychologist Mihaly Csíkszentmihalyi (chik-sent-me-high) proposes that activities which reduce the tension caused by drive reduction are more *pleasurable* than *enjoyable*. While satisfying hunger and quenching thirst are activities that feel good, they do not provide lasting feelings of well-being and happiness. Enjoyable activities, such as helping others (altruism) and participating in challenging, fulfilling activities (flow), produce good feelings that endure beyond the experience.
A Hierarchy of Motives

Some needs take priority over others. At this moment, with your needs for air and water hopefully satisfied, other motives—such as your desire to achieve (discussed in Module 52)—are emerging and directing your behavior. Let your need for water go unsatisfied and your thirst will preoccupy you. Just ask Aron Ralston. Deprived of air, your thirst would disappear.

Abraham Maslow (1970) described these priorities as a hierarchy of needs (FIGURE 37.3). At the base of this pyramid are our physiological needs, such as those for food and water. Only if these needs are met are we prompted to meet our need for safety, and then to satisfy our needs to give and receive love and to enjoy self-esteem. Beyond this, said Maslow (1971), lies the need to actualize one’s full potential. (More on self-esteem and self-actualization in Modules 57 and 59.)

Near the end of his life, Maslow proposed that some people also reach a level of self-transcendence. At the self-actualization level, people seek to realize their own potential.

Motivational Concepts

Module 37

Arousal and performance

Figure 37.2

Hunger is the most urgent form of poverty.” - ALLIANCE TO END HUNGER, 2002

Hierarchies of needs

Maslow’s pyramid of human needs, beginning at the base with physiological needs that must first be satisfied before higher-level safety needs and then psychological needs become active.

Maslow’s hierarchy of needs

Once our lower-level needs are met, we are prompted to seek higher-level needs. From Maslow, 1970.) For survivors of the disastrous tornadoes that swept across the Midwest and Southeastern United States in 2011, satisfying very basic needs for water, food, and safety became top priority. Higher-level needs on Maslow’s hierarchy, such as respect, self-actualization, and meaning, become far less important during such times.

Arousal and performance

Figure 37.3

TRM

Enrichment

Myron Zuckerman argues that people differ in the amount of stimulation they need or want. He and others have identified 4 forms of sensation seeking:

- **Thrill- and Adventure-Seeking**
  Some people may seek excitement in risky but socially acceptable activities such as parachute jumping, skydiving, and race-car driving.

- **Experience-Seeking**
  This represents the desire to seek sensation through the mind, the senses, and a nonconforming lifestyle.

- **Disinhibition**
  Those who have chosen a middle-class lifestyle but find it boring may seek escape in social drinking and partying.

- **Boredom Susceptibility**
  This occurs when people have a low tolerance for experiences that are repetitive or constant.

Use Student Activity: Sensation-Seeking Scale from the TRM to have students assess their own levels of sensation seeking.
At the self-transcendence level, people strive for meaning, purpose, and communion that is beyond the self, that is transpersonal (Koltko-Rivera, 2006).

Maslow’s hierarchy is somewhat arbitrary; the order of such needs is not universally fixed. People have starved themselves to make a political statement. Today’s evolutionary psychologists concur with the first four levels of Maslow’s needs pyramid. But they note that gaining and retaining mates, and parenting offspring, are also universal human motives (Kernick et al., 2013).

Nevertheless, the simple idea that some motives are more compelling than others provides a framework for thinking about motivation. Worldwide life-satisfaction surveys support this basic idea (Oishi et al., 1999; Tay & Diener, 2011). In poorer nations that lack easy access to money and the food and shelter it buys, financial satisfaction more strongly predicts feelings of well-being. In wealthy nations, where most are able to meet basic needs, home-life satisfaction is a better predictor. Self-esteem matters most in individualist nations, whose citizens tend to focus more on personal achievements than on family and community identity. (TABLE 37.1 summarizes the strengths and weaknesses of the different perspectives on motivation.)

In the ensuing modules, we will consider four representative motives, beginning at the physiological level with hunger and working up through sexual motivation and the need to belong. At each level, we shall see how experience interacts with biology.

### Table 37.1: Motivational Perspectives

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<th>Strength</th>
<th>Weakness</th>
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<tr>
<td>Instinct Theory and Evolutionary Psychology</td>
<td>Evolutionary psychology helps explain behavioral similarities due to adaptations from our ancestral past.</td>
<td>Instinct theory explains animal behavior better than human behavior; humans have few true instincts.</td>
</tr>
<tr>
<td>Drive-Reduction Theory</td>
<td>Explains our motivation to reduce arousal by meeting basic needs, such as hunger or thirst.</td>
<td>Does not explain why some motivated behaviors increase arousal.</td>
</tr>
<tr>
<td>Optimal Arousal Theory</td>
<td>Explains that motivated behaviors may decrease or increase arousal.</td>
<td>Does not explain our motivation to address our more complex social needs.</td>
</tr>
<tr>
<td>Maslow’s Hierarchy of Needs</td>
<td>Incorporates the idea that we have various levels of needs, including lower-level physiological and safety needs, and higher-level social, self-esteem, actualization, and meaning needs.</td>
<td>The order of needs may change in some circumstances. Evolutionary psychologists note the absence in the hierarchy of the universal human motives to find a mate and reproduce.</td>
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### Before You Move On

**ASK YOURSELF**

Consider your own experiences in relation to Maslow’s hierarchy of needs. Have you ever experienced true hunger or thirst that displaced your concern for other, higher-level needs? Do you usually feel safe? Loved? Confident? How often do you feel you are able to address what Maslow called your “self-actualization” needs?

**TEST YOURSELF**

While on a long road trip, you suddenly feel very hungry. You see a diner that looks pretty deserted and creepy, but you are really hungry, so you stop anyway. What motivational perspective would most easily explain this behavior, and why?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.
Module 37 Review

37-1 How do psychologists define motivation? From what perspectives do they view motivated behavior?

- Motivation is a need or desire that energizes and directs behavior.
- The instinct/evolutionary perspective explores genetic influences on complex behaviors.
- Drive-reduction theory explores how physiological needs create aroused tension states (drives) that direct us to satisfy those needs. Environmental incentives can intensify drives. Drive-reduction's goal is homeostasis, maintaining a steady internal state.
- Optimal arousal theory proposes that some behaviors (such as driven by curiosity) do not reduce physiological needs but rather are prompted by a search for an optimum level of arousal.
- Abraham Maslow's hierarchy of needs proposes a pyramid of human needs, from basic needs such as hunger and thirst up to higher-level needs such as self-actualization and self-transcendence.

Multiple-Choice Questions

1. Which of the following is an unlearned, complex behavior exhibited by all members of a species?
   a. Reflex
   b. Drive
   c. Incentive
   d. Instinct
   e. Motive

2. Which of the following is a conclusion that can be drawn from the Yerkes-Dodson law?
   a. Performance on easy tasks is best when arousal is low.
   b. Performance is best when arousal is extremely high.
   c. Performance is best when arousal is extremely low.
   d. Performance on difficult tasks is best when arousal is high.
   e. Performance is best when arousal is moderate.

3. Which of the following is the lowest priority motive in Abraham Maslow's hierarchy of needs?
   a. Belongingness and love needs
   b. Physiological needs
   c. Esteem needs
   d. Self-actualization needs
   e. Self-transcendence needs

Practice FRQs

1. How can you use Maslow's hierarchy of needs to explain why a hungry young person would steal?
   a. Physiological needs.

2. Describe how three different motivational theories could explain a young man's desire to become an excellent soccer player.
   (3 points)

Answer 2

1 point: He may play because of incentives, like a college scholarship or a pro contract.

1 point: He may play because soccer provides him with the optimum level of arousal.

1 point: He may play because it helps him fulfill a need level on Maslow's hierarchy. For example, being a member of a soccer team may help him meet his belonging needs.
Module 38

Hunger Motivation

Module Learning Objectives

38-1 Describe the physiological factors that produce hunger.
38-2 Discuss cultural and situational factors that influence hunger.
38-3 Discuss the factors that predispose some people to become and remain obese.

The power of physiological needs was vividly demonstrated when Ancel Keys and his research team (1950) conducted a now-classic study of semistarvation. They first fed 36 male volunteers (all wartime conscientious objectors) just enough to maintain their initial weight. Then, for six months, they cut this food level in half. The effects soon became visible. Without thinking about it, the men began conserving energy. They appeared sluggish and dull. After dropping rapidly, their body weights stabilized at about 25 percent below their starting point.

As Maslow might have guessed, the men became food obsessed. They talked food. They daydreamed food. They collected recipes, read cookbooks, and feasted their eyes on delectable forbidden food. Preoccupied with their unmet basic need, they lost interest in sex and social activities. As one man reported, “If we see a show, the most interesting part of it is contained in scenes where people are eating. I couldn’t laugh at the funniest picture in the world, and love scenes are completely dull.”

The semistarved men’s preoccupations illustrate how activated motives can hijack our consciousness. As journalist Dorothy Dix (1861–1951) observed, “Nobody wants to kiss when they are hungry.” When we’re hungry, thirsty, fatigued, or sexually aroused, little else seems to matter. When we’re not, food, water, sleep, or sex just don’t seem like such big things in life, now or ever.
In studies, people in a motivational “hot” state (from fatigue, hunger, or sexual arousal) have easily recalled such feelings in their own past and have perceived them as driving forces in others’ behavior (Nordgren et al., 2006, 2007). (You may recall from Module 32 a parallel effect of our current good or bad mood on our memories.) Grocery shop with an empty stomach and you are more likely to see those jelly-filled doughnuts as just what you’ve always loved and will be wanting tomorrow. Motives matter mightily.

**The Physiology of Hunger**

**38-1 What physiological factors produce hunger?**

Deprived of a normal food supply, Keys’ semistarved volunteers were clearly hungry. But what precisely triggers hunger? Are the pangs of an empty stomach the source of hunger? So it seemed to A. L. Washburn. Working with Walter Cannon (Cannon & Washburn, 1912), Washburn agreed to swallow a balloon attached to a recording device (FIGURE 38.1). When inflated to fill his stomach, the balloon transmitted his stomach contractions. Washburn supplied information about his feelings of hunger by pressing a key each time he felt a hunger pang. The discovery: Washburn was indeed having stomach contractions whenever he felt hungry.

Can hunger exist without stomach pangs? To answer that question, researchers removed some rats’ stomachs and created a direct path to their small intestines (Tsang, 1938). Did the rats continue to eat? Indeed they did. Some hunger persists similarly in humans whose stomachs have been removed as a treatment for ulcers or cancer. So the pangs of an empty stomach are not the only source of hunger. What else might trigger hunger?

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**Body Chemistry and the Brain**

Somehow, somewhere, your body is keeping tabs on the energy it takes in and the energy it uses. If this weren’t true, you would be unable to maintain a stable body weight. A major source of energy in your body is the blood sugar glucose. If your blood glucose level drops, you won’t consciously feel this change, but your stomach, intestines, and liver will signal your brain to motivate eating. Your brain, which is automatically monitoring your body chemistry and your body’s internal state, will then trigger hunger.

**Figure 38.1 Monitoring stomach contractions**

Using this procedure, Washburn showed that stomach contractions (transmitted by the stomach balloon) accompany our feelings of hunger (indicated by a key press). (From Cannon, 1929.)

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**Enrichment**

Extremes in blood sugar levels can be harmful to one’s health.

- **Hypoglycemia** occurs when blood sugar levels run too low because of a lack of food. This condition is accompanied by feelings of dizziness and weakness.
- **Hyperglycemia** occurs when blood sugar levels run too high. This condition, also known as diabetes, results when cells in the pancreas do not metabolize carbohydrates.
Active Learning

Research on the role of the hypothalamus in weight control has raised hope of a weight-control pill that triggers the appropriate part of this region of the brain either to feel hungry or not need food. These parts of the brain are often confused, but they are important for the students to know. Use this mnemonic to help students remember the difference:

- Lateral hypothalamus (LH) gives one a Large Hunger, or the desire to eat.
- Ventromedial hypothalamus (VMH) gives one Very Minute Hunger, or the feeling of satiety.

How does the brain integrate these messages and sound the alarm? The work is done by several neural areas, some housed deep in the brain within the hypothalamus (FIGURE 38.2). This neural traffic intersection includes areas that influence eating. For example, one neural arc (called the ancius arcus) has a center that secretes appetite-stimulating hormones, and another center that secretes appetite-suppressing hormones. Explorations of this neural area and others reveal that when an appetite-enhancing center is stimulated electrically, well-fed animals begin to eat. If the area is destroyed, even starving animals have no interest in food. The opposite occurs when an appetite-suppressing area is stimulated: Animals will stop eating. Destroy this area and animals will eat and eat, and become extremely fat (Duggan & Booth, 1986; Hoebel & Teitelbaum, 1966) (FIGURE 38.3).

Blood vessels supply the hypothalamus, enabling it to respond to our current blood chemistry as well as to incoming neural information about the body's state. One of its tasks is monitoring levels of appetite hormones, such as ghrelin, a hunger-rousing hormone secreted by an empty stomach. During bypass surgery for severe obesity, surgeons seal off part of the stomach. The remaining stomach then produces much less ghrelin, and the person's appetite lessens (Lemonick, 2002). Other appetite hormones include insulin, leptin, ghrelin, and PYY; FIGURES 38.3 and 38.4 illustrate and describe how they influence your feelings of hunger.

The interaction of appetite hormones and brain activity suggests that the body has some sort of "weight thermostat." When semistarved rats fall below their normal weight, this system signals the body to restore the lost weight. The rat's hunger increases and their energy output decreases. If body weight stays above their previous calories.

How did their bodies achieve this dieter's nightmare? They reduced their energy expenditure, partly by being less active, but partly by dropping their basal metabolic rate by 29 percent. How much energy we use to maintain basic body functions when our body is at rest. But we share a common response to decreased food intake: Our basal metabolic rate drops, as it did for participants in Keys' experiment. After 24 weeks of semistarvation, they stabilized at three-quarters of their normal weight, although they were taking in only half their previous calories. How did their bodies achieve this dieter's nightmare? They reduced their energy expenditure, partly by being less active, but partly by dropping their basal metabolic rate by 29 percent.

Some researchers have suggested that the idea of a biologically fixed set point is too rigid to explain some things. One thing it doesn’t address is that slow, sustained changes in body weight can alter a person's set point (Assanand et al., 1998). Another is that when we
have unlimited access to a wide variety of tasty foods, we tend to overeat and gain weight (Raynor & Epstein, 2001). And set points don’t explain why psychological factors influence hunger. For all these reasons, some prefer the loose term settling point or set range to indicate the level at which a person’s weight settles in response to caloric intake and energy use. As we will see next, these factors are influenced by environment as well as biology.

**The Psychology of Hunger**

### What cultural and situational factors influence hunger?

We have seen that our eagerness to eat is pushed by our body chemistry and brain activity. Yet there is more to hunger than meets the stomach. This was strikingly apparent when trickster researchers tested two patients who had no memory for events occurring more than a minute ago (Rozin et al., 1998). If offered a second lunch 20 minutes after eating a normal lunch, both patients readily consumed it . . . and usually a third meal offered 20 minutes after they finished the second. This suggests that one part of our decision to eat is our memory of the time of our last meal. As time passes, we think about eating again, and those thoughts trigger feelings of hunger.

### Taste Preferences: Biology and Culture

Body chemistry and environmental factors together influence not only the when of hunger, but also the what—our taste preferences. When feeling tense or depressed, do you crave starchy, carbohydrate-laden foods? Carbohydrates such as pasta, chips, and sweets help boost levels of the neurotransmitter serotonin, which has calming effects. When stressed, even rats find it extra rewarding to scarf Oreos (Artiga et al., 2007; Boggiano et al., 2005).

#### Common Pitfalls

Even though the names of these hormones do not appear in bold, they are important for students to know. Be sure students pay attention to the descriptions of each so they understand which hormones are important for feeling both hunger and satiety.

#### Teaching Tip

Mention some of the following findings about the importance of taste preferences and hunger:

- Some researchers argue that at some point in human evolution, being a supertaster may have improved chances of survival in parts of the world where there were many poisonous plants, since these tend to taste bitter. On the other hand, being a nontaster might have been an advantage in safer environments.
- Supertasters seem to be more sensitive to tastes because they have more taste buds on their tongues.
- Supertasters tend to find bitter foods nastily bitter and sweet foods excessively sweet. Dairy fat tastes creamier, chili peppers are hotter, and carbonated beverages may seem unpleasantly bubbly.
- Supertasters find that saccharin has an unpleasant aftertaste; nontasters are likely to say it tastes fine.
- Female supertasters are less likely to be overweight and appear to have better cholesterol levels.
Enrichment

Taste preferences often seem arbitrary and irrational. Muslims and Jews don’t eat pigs, Hindus don’t eat cows, and Westerners are unlikely to eat bugs. Muslims and Jews consider the pig unclean. Hindus believe the cow is sacred, and Westerners are usually disgusted by the thought of eating an ant. An anthropologist at the University of Florida argues that all taste preferences ultimately result from a careful calculation of rewards and costs. Our disgust with ants and termites, for example, originated because gathering them was a waste of energy. Many other foods were more readily available and hence more easily acquired. Not so for certain Amazonian tribes that consider a stick full of crawling ants or termites to be a real delicacy.

Active Learning

The text suggests that culture has a large impact on our eating habits and taste preferences. With permission, interview students from other cultures to find out what foods they eat that are different from foods common to American culture. Also, have students research how other cultures view body images—whether thin is “in” elsewhere in the world.

Enrichment

Our preferences for sweet and salty tastes are genetic and universal, but conditioning can intensify or alter those preferences. People given highly salted foods may develop a liking for excess salt (Beachamp, 1987). People sickened by a food may develop an aversion to it. (The frequency of children’s illnesses provides many chances for them to learn to avoid certain foods.) Our culture teaches us that some foods are acceptable but others are not. Bedouins enjoy eating the eye of a camel, which most North Americans would find repulsive. North Americans and Europeans also shun horse, dog, and rat meat, all of which are prized elsewhere.

But there is biological wisdom to many of our taste preferences. Environments can influence the human genetics that affect diet and taste. In places where agriculture has produced milk, for example, survival patterns have favored people with lactose tolerance (Arjamaa & Vuorisalo, 2010). And in hot climates (where foods spoil more quickly) recipes often include spices that inhibit the growth of bacteria (Figure 38.5). India averages nearly 10 spices per meat recipe; Finland, 2 spices. Pregnant women’s food dislikes—and the nausea associated with them—peak about the tenth week, when the developing embryo is most vulnerable to toxins.

Rats tend to avoid unfamiliar foods (Sclafani, 1995). So do we, especially those that are animal based. This neophobia (dislike of things unfamiliar) surely was adaptive for our ancestors by protecting them from potentially toxic substances. In time, though, most people who repeatedly sample an initially novel fruit drink or food come to appreciate the new taste (Pliner, 1982, Pliner et al., 1993).

Situational Influences on Eating

To a surprising extent, situations also control our eating—a phenomenon psychologists have called the ecology of eating. Here are three situations you may have noticed but underestimated:

- Do you eat more when eating with others? Most of us do (Herman et al., 2003; Hetherington et al., 2006). After a party, you may realize you’ve overeaten. This happens because the presence of others tends to amplify our natural behavior tendencies. (You’ll hear more about social facilitation in Module 76.)
- Unit bias occurs with similar mindlessness. Working with researchers at France’s National Center for Scientific Research, Andrew Geier and his colleagues (2006) explored a possible explanation of why French waistlines are smaller than American waistlines. From soda drinks to yogurt sizes, the French offer foods in smaller portion sizes. Does it matter? (One could as well order two small sandwiches as one large one.) To find out, the investigators offered people varieties of free snacks. For example, in the lobby of an apartment house, they laid out either full or half pretzels, big or little Tootsie Rolls, or a big bowl of M&M’s with either a small or large scoop of ice cream. People generally preferred the large portion size.

Use Student Activity: A Week of Food from the TRM to help students evaluate their own eating habits.
people being weak-willed gluttons. Those not having the surgery improved memory performance 12 weeks after severely obese people had weight-loss surgery and lost significant weight (Bruce-Keller et al., 2009; Whitmer et al., 2010). 

Recent research also has linked women’s obesity to their risk of late-life cognitive decline, including Alzheimer’s disease and brain tissue loss (Bruce-Keller et al., 2009; Whitmer et al., 2010). And, as we will see, obesity has physical health risks as well. Fat and few overweight people win the battle of the bulge. Why? And why do some people gain weight while others eat the same amount and seldom add a pound?

The Physiology of Obesity

Our bodies store fat for good reasons. Fat is an ideal form of stored energy—a high-calorie fuel reserve to carry the body through periods when food is scarce—a common occurrence in our prehistoric ancestors’ world. No wonder that in many developing societies today (as in Europe in earlier centuries) people find heavier bodies attractive: Obesity signals affluence and social status (Furnham & Baguma, 1994; Swami et al., 2011).

In parts of the world where food and sweets are now abundantly available, the rule that once served our hungry distant ancestors—When you find energy-rich fat or sugar, eat it!—has become dysfunctional. Pretty much everywhere this book is being read, people find heavier bodies attractive: Obesity signals affluence and social status (Furnham & Baguma, 1994; Swami et al., 2011).

In the United States, the adult obesity rate has more than doubled in the last 40 years, reaching 34 percent, and child-teen obesity has quadrupled (Flegal et al., 2010). Significant obesity increases the risk of diabetes, high blood pressure, heart disease, gallstones, arthritis, and certain types of cancer, thus increasing health care costs and shortening life expectancy (de Gonzalez et al., 2010; Jarrett et al., 2010; Sun et al., 2009). Research also has linked women’s obesity to their risk of late-life cognitive decline, including Alzheimer’s disease and brain tissue loss (Bruce-Keller et al., 2009; Whitmer et al., 2010). One experiment found improved memory performance 12 weeks after severely obese people had weight-loss surgery and lost significant weight. Those not having the surgery showed some further cognitive decline (Guinstad et al., 2011).

Research on the physiology of obesity challenges the stereotype of severely overweight people being weak-willed gluttons.

Obesity and Weight Control

What factors predispose some people to become and remain obese? Obesity can be socially toxic, by affecting both how you are treated and how you feel about yourself. Obesity has been associated with lower psychological well-being, especially among women, and increased risk of depression (de Wit et al., 2010; Luppino et al., 2010; Mendes, 2010a). Obese 6- to 9-year-olds are 60 percent more likely to suffer bullying (Lumeng et al., 2010). And, as we will see, obesity has physical health risks as well. Fat and few overweight people win the battle of the bulge. Why? And why do some people gain weight while others eat the same amount and seldom add a pound?

The Physiology of Obesity

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Research on the physiology of obesity challenges the stereotype of severely overweight people being weak-willed gluttons.
**SET POINT AND METABOLISM**

Once we become fat, we require less food to maintain our weight than we did to attain it. Fat has a lower metabolic rate than does muscle—it takes less food energy to maintain. When an overweight person’s body drops below its previous set (or settling) point, the person’s hunger increases and metabolism decreases. Thus, the body adapts to starvation by burning off fewer calories.

Learn people also seem naturally disposed to move about. They burn more calories than do energy-conserving overweight people who tend to sit still longer (Levine et al., 2005). These individual differences in resting metabolism help explain why two people of the same height, age, and activity level can maintain the same weight, even if one of them eats much less than the other does.

**THE GENETIC FACTOR**

Do our genes predispose us to fidget or sit still? Studies do reveal a genetic influence on body weight. Consider two examples:

- Despite shared family meals, adoptive siblings’ body weights are uncorrelated with one another or with those of their adoptive parents. Rather, people’s weights resemble those of their biological parents (Grilo & Pogue-Geile, 1991).
- Identical twins have closely similar weights, even when reared apart (Hjelmborg et al., 2006; Plomin et al., 1997). Across studies, their weight correlates +.74. The much lower +.32 correlation among fraternal twins suggests that genes explain two-thirds of their varying body mass (Maes et al., 1997).

**THE FOOD AND ACTIVITY FACTORS**

Genes tell an important part of the obesity story. But environmental factors are mighty important, too.

- Studies in Europe, Japan, and the United States show that children and adults who suffer from sleep loss are more vulnerable to obesity (Keith et al., 2006; Nedelcheva et al., 2010; Tabert, 2004a,b). With sleep deprivation, the levels of leptin (which reports body fat to the brain) fall, and ghrelin (the appetite-stimulating stomach hormone) rise.
- Social influence is another factor. One 32-year study of 12,067 people found them most likely to become obese when a friend became obese (Christakis & Fowler, 2007). If the obese friend was a close one, the odds of likewise becoming obese almost tripled. Moreover, the correlation among friends’ weights was not simply a matter of seeking out similar people as friends. Friends matter.
- The strongest evidence that environment influences weight comes from our fattening world (FIGURE 38.6). What explains this growing problem? Changing food consumption and activity levels are at work. We are eating more and moving less, with lifestyles approaching those of animal feedlots (where farmers fattened inactive animals). In the United States, jobs requiring moderate physical activity declined from about 50 percent in 1960 to 20 percent in 2011 (Church et al., 2011).

The “bottom” line: New stadiums, theaters, and subway cars—but not airplanes—are widening seats to accommodate the girth growth (Hampson, 2000; Kim & Tong, 2010). Washington State Ferries abandoned a 50-year-old standard: “Eighteen-inch butts are a thing of the past” (Shepherd, 1999). New York City, facing a large problem with Big Apple bottoms, has mostly replaced 17.5-inch bucket-style subway seats with bucketless seats (Hampson, 2000). In the end, today’s people need more room.

We will revisit this lesson in Unit XI’s study of individual differences. There can be high levels of heritability (genetic influence on individual differences in such things as intelligence) without heredity explaining group differences. Genes mostly determine why one person today is heavier than another. Environment mostly determines why people today...
are heavier than their counterparts 50 years ago. Our eating behavior also demonstrates the now-familiar interaction among biological, psychological, and social-cultural factors. For tips on shedding unwanted pounds, see Close-up: Waist Management.

Close-up

Waist Management

Perhaps you are shaking your head. "Slim chance I have of becoming and staying thin." People struggling with obesity are well advised to seek medical evaluation and guidance. For others who wish to take off a few pounds, researchers have offered these tips.

Begin only if you feel motivated and self-disciplined. For most people, permanent weight loss requires making a career of staying thin—a lifelong change in eating habits combined with increased exercise.

Exercise and get enough sleep. Inactive people are often overweight (FIGURE 38.7). Especially when supported by 7 to 8 hours of sleep a night, exercise empties fat cells, builds muscle, speeds up metabolism, and helps lower your settling point (Bennett, 1995; Kolata, 1987; Thompson et al., 1982).

Minimize exposure to tempting food cues. Food shop only on a full stomach. Keep tempting foods out of the house, and store other appealing foods out of sight.

Limit variety and eat healthy foods. Given more variety, people consume more; eat simple meals with whole grains, fruits, and vegetables. Healthy fats, such as those found in olive oil and fish, help regulate appetite and artery-clogging cholesterol (Taubes, 2001, 2002). Better crispy greens than Krispy Kremes.

Reduce portion sizes. Serve food with smaller bowls, plates, and utensils.

Don’t starve all day and eat one big meal at night. This eating pattern, common among overweight people, slows metabolism. Moreover, those who eat a balanced breakfast are, by late morning, more alert and less fatigued (Spring et al., 1992).

Beware of the binge. Especially for men, eating slowly can lead to eating less (Martin et al., 2007). Among people who do consciously restrain their eating, drinking alcohol or feeling anxious or depressed can unleash the urge to eat (Hofer & Polivy, 1980).

Before eating with others, decide how much you want to eat. Eating with friends can distract us from monitoring our own eating (Ward & Mann, 2000).

Remember, most people occasionally lapse. A lapse need not become a full collapse. Connect to a support group. Join with others, either face-to-face or online, with whom you can share your goals and progress (Freedman, 2011).

Figure 38.7 American idle: Couch potatoes beware—TV watching correlates with obesity

As lifestyles have become more sedentary and TV watching has increased, so has the percentage of overweight people in Britain, Canada, and the United States (Pagani et al., 2010). When California children were placed in a TV-reduction educational program, they watched less—and lost weight (Robinson, 1999). Don’t watch TV! Then watch out for other screen time that keeps your motor idling.

ENGAGE

Active Learning

Have students keep a food diary for at least a week. They should record all the food they eat and beverages they drink. At the end of the week, have them reflect on the following questions:

- Compare your eating choices with the recommendations suggested by the FDA’s food pyramid and also with MyPlate (www.choosemyplate.gov). Do your eating habits reflect the recommendations for a healthy diet? Why or why not?
- Why did you eat and drink as you did? What were the motives driving your choices?
- After reflecting on your eating choices, what would you change? Why? What would you keep the same? Why?

ENGAGE

Enrichment

Setting realistic goals is key to losing weight effectively. While those who need to lose a lot of weight will do so more quickly at the onset, their goal should not be to lose too much weight too quickly. Steady, moderate weight loss is generally longer lasting than quick, intense weight loss.
Module 38 Review

What physiological factors produce hunger?

- Hunger’s pangs correspond to the stomach’s contractions, but hunger also has other causes.
- Neural areas in the brain, some within the hypothalamus, monitor blood chemistry (including glucose level) and incoming information about the body’s state.
- Appetite hormones include insulin (controls blood glucose); ghrelin (secreted by an empty stomach); orexin (secreted by the hypothalamus); leptin (secreted by fat cells); and PYY (secreted by the digestive tract).
- Basal metabolic rate is the body’s resting rate of energy expenditure.
- The body may have a set point (a biologically fixed tendency to maintain an optimum weight) or a looser settling point (also influenced by the environment).

What cultural and situational factors influence hunger?

- Hunger also reflects our memory of when we last ate and our expectation of when we should eat again.
- Humans as a species prefer certain tastes (such as sweet and salty), but our individual preferences are also influenced by conditioning, culture, and situation.
- Some taste preferences, such as the avoidance of new foods, or of foods that have made us ill, have survival value.

What factors predispose some people to become and remain obese?

- Genes and environment interact to produce obesity.
- Obesity correlates with depression, especially among women.
- Twin and adoption studies indicate that body weight is also genetically influenced.
- Environmental influences include lack of exercise, an abundance of high-calorie food, and social influence.
- Those wishing to lose weight are advised to make a lifelong change in habits: Get enough sleep; boost energy expenditure through exercise; limit variety and minimize exposure to tempting food cues; eat healthy foods and reduce portion sizes; space meals throughout the day; beware of the binge; monitor eating during social events; forgive the occasional lapse; and connect to a support group.
Multiple-Choice Questions

1. Which of the following is the major source of energy in your body?
   a. PYY
   b. Arcuate nucleus
   c. Hypothalamus
   d. Ghrelin
   e. Glucose

2. Which of the following is the best term or phrase for the body's resting rate of energy expenditure?
   a. Hunger
   b. Set point
   c. Basal metabolic rate
   d. Body chemistry
   e. Settling point

3. Which of the following statements is true?
   a. We eat less dessert when there are three different desserts available.
   b. Serving sizes in France are generally larger than in the United States.
   c. Offered a supersized portion, most of us consume fewer calories.
   d. We eat more when we're around others.
   e. Food variety generally decreases appetite.

Answers to Multiple-Choice Questions

1. e
2. c
3. d

Practice FRQs

1. Explain the activity of the appetite hormones insulin and leptin.

   Answer

   1 point: Insulin controls blood glucose.
   1 point: Leptin causes the brain to increase metabolism and decrease hunger.

2. Explain the difference between set point and basal metabolic rate.

   (2 points)

   Answer to Practice FRQ 2

   1 point: Set point is the "weight thermostat"; when weight falls below a certain level, hunger increases and metabolism slows.

   1 point: The basal metabolic rate is the body's resting rate of energy expenditure.
Module 39

Sexual Motivation

Module Learning Objectives

39-1 Describe the human sexual response cycle, and identify the dysfunctions that disrupt it.

39-2 Discuss the impact of hormones, and external and internal stimuli, on human sexual motivation.

Sex is part of life. Had this not been so for all your ancestors, you would not be reading this book. Sexual motivation is nature’s clever way of making people procreate, thus enabling our species’ survival. When two people feel an attraction, they hardly stop to think of themselves as guided by their genes. As the pleasure we take in eating is nature’s method of getting our body nourishment, so the desires and pleasures of sex are our genes’ way of preserving and spreading themselves. Life is sexually transmitted.

The Physiology of Sex

Like hunger, sexual arousal depends on the interplay of internal and external stimuli. To understand sexual motivation, we must consider both.

The Sexual Response Cycle

In the 1960s, gynecologist-obstetrician William Masters and his collaborator Virginia Johnson (1966) made headlines by recording the physiological responses of volunteers who masturbated or had intercourse. With the help of 382 female and 312 male volunteers—a somewhat atypical sample, consisting only of people able and willing to display arousal and orgasm while being observed in a laboratory—Masters and Johnson monitored or filmed more than 10,000 sexual “cycles.” Their description of the sexual response cycle identified four stages. During the initial excitement phase, men’s and women’s genital areas become engorged with blood, a woman’s vagina expands and secretes lubricant, and her breasts and nipples may enlarge. In the plateau phase, excitement peaks as breathing, pulse, and blood pressure rates continue to increase. The penis becomes fully engorged and some fluid—frequently containing enough live sperm to enable conception—may appear at its tip. Vaginal secretion continues to increase.

Masters and Johnson observed muscle contractions all over the body during orgasm; these were accompanied by further increases in breathing, pulse, and blood pressure rates.

Concept Connections

The sexual response stages are similar to Hans Selye’s General Adaptation Syndrome (GAS), which describes the body’s physiological response to stress (Module 43). First, the GAS describes the alarm reaction phase, in which the body recognizes and prepares to address the stress in a way that resembles the excitement phase of sex. Then, the GAS describes the resistance phase, in which the body fights the stress for an indefinite amount of time, much like the plateau phase. Finally, the body either conquers the stress or exhausts the resources needed to further handle it, resulting in the exhaustion phase of GAS. This is similar to the orgasm and resolution phases of the sexual response cycle. Thus, the body’s reaction to stress is not much different than the body’s response to sex.
At orgasm, pulse rate surges from about 70 to 115 beats per minute (Jackson, 2009). A woman's arousal and orgasm facilitate conception by positioning the uterus to receive sperm, and drawing the sperm further inward. A woman's orgasm therefore not only reinforces intercourse, which is essential to natural reproduction, it also increases retention of deposited sperm (Furlow & Thornhill, 1996).

The pleasurable feeling of sexual release apparently is much the same for both sexes. In one study, a panel of experts could not reliably distinguish between descriptions of orgasm written by men and those written by women (Vance & Wagner, 1976). University of Groningen neuroscientist Gert Holstege and his colleagues (2003a,b) understand why. They discovered that when men and women undergo PET scans while having orgasms, the same subcortical brain regions glow. And when people who are passionately in love undergo fMRI scans while viewing photos of their beloved or of a stranger, men's and women's brain responses to their partner are pretty similar (Fisher et al., 2002).

The body gradually returns to its unaroused state as the engorged genital blood vessels release their accumulated blood—relatively quickly if orgasm has occurred, relatively slowly otherwise. (It's like the nasal tickle that goes away rapidly if you have sneezed, slowly otherwise.) During this resolution phase, the male enters a refractory period, lasting from a few minutes to a day or more, during which he is incapable of another orgasm. The female's much shorter refractory period may enable her to have more orgasms if restimulated during or soon after resolution.

Sexual Dysfunctions and Paraphilias
Masters and Johnson sought not only to describe the human sexual response cycle but also to understand and treat the inability to complete it. Sexual dysfunctions are problems that consistently impair sexual arousal or functioning. Some involve sexual motivation, especially lack of sexual energy and arousability. For men, others include erectile disorder (inability to have or maintain an erection) and premature ejaculation. For women, the problem may be pain or female orgasmic disorder (distress over infrequently or never experiencing orgasm). In separate surveys of some 3000 Boston women and 32,000 other American women, about 4 in 10 reported a sexual problem, such as orgasmic disorder or low desire, but only about 1 in 8 reported that this caused personal distress (Lutfey et al., 2009; Shifren et al., 2008). Most women who experience sexual distress relate it to their emotional relationship with the partner during sex (Bancroft et al., 2003).

Men and women with sexual dysfunctions can often be helped through therapy. In behaviorally oriented therapy, for example, men learn ways to control their urge to ejaculate, and women are trained to bring themselves to orgasm. Starting with the introduction of Viagra in 1998, erectile disorder has been routinely treated by taking a pill.

Sexual dysfunction involves problems with arousal or sexual functioning. People with paraphilias such as exhibitionism, fetishism, and pedophilia, do experience sexual arousal, but they direct it in unusual ways. The American Psychiatric Association (2013) only classifies such behavior as disordered if
- a person experiences distress from their unusual sexual interest or
- the sexual desire or behavior entails harm or risk of harm to others.

Hormones and Sexual Behavior

How do hormones, and external and internal stimuli, influence human sexual motivation?
Sex hormones have two effects: They direct the physical development of male and female sex characteristics, and (especially in nonhuman animals) they activate sexual behavior. In most mammals, nature neatly synchronizes sex with fertility. The female becomes sexually receptive

**Refraction period** a resting period after orgasm, during which a man cannot achieve another orgasm. Sexual dysfunction a problem that consistently impairs sexual arousal or functioning.

**FYI** In a National Center for Health Statistics survey of adult Americans, using computer-assisted self-interviews that guaranteed privacy, nearly 99 percent of 50- to 59-year-olds reported having had sex with someone (Fryer et al., 2007).
onset of puberty until marriage. If today’s teens intend to abstain from sex until marriage, they must wait over 12 years between the age of 12. Along with this backward trend, the average age at time of marriage has increased: from 22 to about 25 years of age. If today’s teens intend to abstain from sex until marriage, they must wait over 12 years between the onset of puberty until marriage.

AP® Exam Tip
The central principle here is that there are many biological processes that govern human behavior less rigidly than they govern the behaviors of other species. Because of our highly developed brain, sex hormones have less control over our behavior than they do over other animals’ behavior.

TEACH
Common Pitfalls
Students may be surprised to read that women secrete testosterone. In fact, men and women secrete both sex hormones, but men secrete more testosterone than women, and women secrete more estrogens than men. However, as Myers points out, testosterone plays a role for both men and women in their levels of sexual desire.

TEACH
Concept Connections
Connect this topic with developmental psychology and Unit IX by discussing how the onset of puberty has changed for both boys and girls in the last 100 years. A century ago, girls matured sexually around 15 years of age, whereas today they do so at around age 12. Along with this backward trend, the average age at time of marriage has increased: from 22 to about 25 years of age. If today’s teens intend to abstain from sex until marriage, they must wait over 12 years between the onset of puberty until marriage.

(estrogens) are hormones, such as estradiol, secreted in greater amounts by females than by males and contributing to female sex characteristics. In nonhuman female mammals, estrogen levels peak during ovulation, promoting sexual receptivity.

Testosterone is the most important of the male sex hormones. Both males and females have it, but the additional testosterone in males stimulates the growth of the male sex organs in the fetus and the development of the male sex characteristics during puberty.

(2011). For men with abnormally low testosterone levels, testosterone-replacement therapy often increases sexual desire and also energy and vitality (Yates, 2000).

In men, normal fluctuations in testosterone levels, from man to man and hour to hour, have little effect on sexual drive (Bryce, 1982). Indeed, fluctuations in male hormones are partly a response to sexual stimulation. In the presence of an attractive female, Australian skateboarders’ testosterone surges, which contributes to riskier moves and more crash landings (Ronay & von Hippel, 2010). Thus, sexual arousal can be a cause as well as a consequence of increased testosterone levels.

Although normal short-term hormonal changes have little effect on men’s and women’s desire, large hormonal shifts over the life span have a greater effect. A person’s interest in dating and sexual stimulation usually increases with the pubertal surge in sex hormones. If the hormonal surge is precluded—as it was during the 1600s and 1700s for prepubescent boys who were castrated to preserve their soprano voices for Italian opera—the normal development of sex characteristics and sexual desire does not occur (Peschel & Peschel, 1987). When adult men are castrated, sex drive typically falls as testosterone levels decline sharply (Flacker & Bain, 1990). Male sex offenders taking Depo-Provera, a drug that reduces testosterone levels to that of a prepubertal boy, similarly lose much of their sexual urge (Bidleman, 2009; Moeyn et al., 1983). In later life, as sex hormone levels decline, the frequency of sexual fantasies and intercourse declines as well (Kleinberg & Henning, 1995).

To summarize: We might compare human sex hormones, especially testosterone, to the fuel in a car. Without fuel, a car will not run. But if the fuel level is minimally adequate, adding more fuel to the gas tank won’t change how the car runs. The analogy is imperfect, because hormones and sexual motivation interact. However, it correctly suggests that biology is a necessary but not sufficient explanation of human sexual behavior. The hormonal fuel is essential, but so are the psychological stimuli that turn on the engine, keep it running, and shift it into high gear.

(in other animals, being “in heat”) when secretion of the female hormones, the estrogens (such as estradiol), peaks during ovulation. In experiments, researchers can stimulate receptivity by injecting female animals with an estrogen. Male hormone levels are more constant, and hormone injection does not so easily manipulate the sexual behavior of male animals (Feder, 1984). Nevertheless, castrated male rats—having lost their testes, which manufacture the male sex hormone testosterone—gradually lose much of their interest in receptive females. They gradually regain it if injected with testosterone.

In humans, hormones more loosely influence sexual behavior, although sexual desire rises slightly at ovulation among women with menses (Pillsbury et al., 2004). When at peak fertility in their menstrual cycle, women express increased preference for masculine faces and ability to detect sexual orientation, but also increased apprehensiveness of men perceived as potentially sexually coercive (Eastwick, 2009; Little et al., 2008; Navarrete et al., 2009, Rule et al., 2011). One study invited partnered women not at risk for pregnancy to keep a diary of their sexual activity. (These women were either using intrauterine devices or had undergone surgery to prevent pregnancy.) On the days around ovulation, intercourse was 24 percent more frequent (Wilcox et al., 2004).

Women’s sexuality differs from that of other mammalian females in being more responsive to testosterone level (van Anders & Dunn, 2009). If a woman’s natural testosterone level drops, as happens with removal of the ovaries or adrenal glands, her sexual interest may wane. But testosterone-replacement therapy sometimes restores diminished sexual appetite. That is the finding of experiments with hundreds of surgically or naturally menopausal women, for whom a testosterone-replacement patch restored sexual activity, arousal, and desire more than did a placebo (Braunstein et al., 2005; Buster et al., 2005; Petersen & Hyde, 2011). For men with abnormally low testosterone levels, testosterone-replacement therapy often increases sexual desire and also energy and vitality (Yates, 2000).

In men, normal fluctuations in testosterone levels, from man to man and hour to hour, have little effect on sexual drive (Bryce, 1982). Indeed, fluctuations in male hormones are partly a response to sexual stimulation. In the presence of an attractive female, Australian skateboarders’ testosterone surges, which contributes to riskier moves and more crash landings (Ronay & von Hippel, 2010). Thus, sexual arousal can be a cause as well as a consequence of increased testosterone levels.

Although normal short-term hormonal changes have little effect on men’s and women’s desire, large hormonal shifts over the life span have a greater effect. A person’s interest in dating and sexual stimulation usually increases with the pubertal surge in sex hormones. If the hormonal surge is precluded—as it was during the 1600s and 1700s for prepubescent boys who were castrated to preserve their soprano voices for Italian opera—the normal development of sex characteristics and sexual desire does not occur (Peschel & Peschel, 1987). When adult men are castrated, sex drive typically falls as testosterone levels decline sharply (Flacker & Bain, 1990). Male sex offenders taking Depo-Provera, a drug that reduces testosterone levels to that of a prepubertal boy, similarly lose much of their sexual urge (Bidleman, 2009; Moeyn et al., 1983). In later life, as sex hormone levels decline, the frequency of sexual fantasies and intercourse declines as well (Kleinberg & Henning, 1995).

To summarize: We might compare human sex hormones, especially testosterone, to the fuel in a car. Without fuel, a car will not run. But if the fuel level is minimally adequate, adding more fuel to the gas tank won’t change how the car runs. The analogy is imperfect, because hormones and sexual motivation interact. However, it correctly suggests that biology is a necessary but not sufficient explanation of human sexual behavior. The hormonal fuel is essential, but so are the psychological stimuli that turn on the engine, keep it running, and shift it into high gear.
The Psychology of Sex

Hunger and sex are different sorts of motivations. Hunger responds to a need. If we do not eat, we die. Sex is not in this sense a need. (We may feel like dying, but we do not.) Nevertheless, there are similarities between hunger and sexual motivation. Both depend on internal physiological factors. Both reflect the interplay of excitation and inhibitory responses—the body’s acceleration and braking systems (Bancroft et al., 2009). And both are influenced by external and imagined stimuli, and by cultural expectations (FIGURE 39.1).

External Stimuli

Many studies confirm that men become aroused when they see, hear, or read erotic material. Surprising to many (because sexually explicit materials are marketed mostly to men) is that most women—at least the less-inhibited women who volunteer to participate in such studies—report or exhibit nearly as much arousal to the same stimuli (Heiman, 1975; Stockton & Murnen, 1992). (Their brains do, however, respond differently, with fMRI scans revealing a more active amygdala in men viewing erotica [Hamann et al., 2004].) In 132 such experiments, men’s feelings of sexual arousal have much more closely mirrored their (more obvious) genital response than have women’s (Chivers et al., 2010).

People may find sexual arousal either pleasing or disturbing. (Those who wish to control their arousal often limit their exposure to such materials, just as those wishing to control hunger limit their exposure to tempting cues.) With repeated exposure, the emotional response to any erotic stimulus often lessens, or habituates. During the 1920s, when Western women’s hemlines first reached the knee, an exposed leg was a mildly erotic stimulus.

Can sexually explicit material have adverse effects? Research indicates that it can. Depictions of women being sexually coerced—and liking it—tend to increase viewers’ acceptance of the false idea that women enjoy rape, and they tend to increase male viewers’ willingness to hurt women (Malamuth & Check, 1981; Zillmann, 1989). Viewing images of sexually attractive women and men may also lead people to devalue their own partners and relationships. After male collegians viewed TV or magazine depictions of sexually attractive women, they often found an average woman, or their own girlfriend or wife, less attractive (Kernick & Gutierrez, 1980; Kentik et al., 1989; Weaver et al., 1984). Viewing X-rated sex films similarly tends to diminish people’s satisfaction with their own sexual partner (Zillmann, 1989). Perhaps reading or watching erotica creates expectations that few men and women can fulfill.
ENGAGE
Active Learning
Divide students into small groups to research laws and policies concerning sex education in your state. With the class, discuss these programs and how they differ across various communities.

- Do the policies differ from school system to school system?
- Why were certain policies adopted in some communities?
- What does psychological research say about the effectiveness of different types of sex education programs?
- Now that a vaccine is available for the human papilloma virus (HPV), which causes pelvic inflammatory disease (PID) and can lead to cervical cancer, several states are debating whether to make the vaccine mandatory for all teenage girls. Should states mandate it as they did for the measles vaccine for children? Why or why not?

CLOSE & ASSESS
Exit Assessment
Have students describe the sexual response cycle as an exit slip. As an additional assessment, have them compare the refractory period in the sexual response cycle with the same period in the firing of an action potential.

Imagined Stimuli
The brain, it has been said, is our most significant sex organ. The stimuli inside our heads—our imagination—can influence sexual arousal and desire. People who, because of a spinal-cord injury, have no genital sensation can still feel sexual desire (Willmuth, 1987). Consider, too, the erotic potential of dreams. Sleep researchers have discovered that genital arousal accompanies all types of dreams, even though most dreams have no sexual content. But in nearly all men and some 40 percent of women, dreams sometimes contain sexual imagery that leads to orgasm (Wells, 1986). In men, nighttime orgasm and nocturnal emissions (“wet dreams”) are more likely when orgasm has not occurred recently.

About 95 percent of both men and women say they have sexual fantasies. Men (whether gay or straight) fantasize about sex more often, more physically, and less romantically. They also prefer less personal and faster-paced sexual content in books and videos (Leitenberg & Henning, 1995). Fantasizing about sex does not indicate a sexual problem or dissatisfaction. If anything, sexually active people have more sexual fantasies.

Before You Move On

> ASK YOURSELF
What psychological and social-cultural factors have affected your sexual motivation?

> TEST YOURSELF
How might the evolutionary perspective, drive-reduction theory, and arousal theory explain our sexual motivation?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 39 Review

39-1 What is the human sexual response cycle, and what dysfunctions disrupt it?
- William Masters and Virginia Johnson described four stages in the human sexual response cycle: excitement, plateau, orgasm (which seems to involve similar feelings and brain activity in males and females), and resolution.
- In the resolution phase, males experience a refractory period, during which renewed arousal and orgasm are impossible.
- Sexual dysfunctions are problems that consistently impair sexual arousal or functioning. They can often be successfully treated by behaviorally oriented therapy or drug therapy.

39-2 How do hormones, and external and internal stimuli, influence human sexual motivation?
- The female estrogen and male testosterone hormones influence human sexual behavior less directly than they influence sexual behavior in other species. Short-term shifts in testosterone level are normal in men, partly in response to stimulation.
- External stimuli can trigger sexual arousal in both men and women, although the activated brain areas differ somewhat.
  - Men respond more specifically to sexual depictions involving their preferred sex.
  - Sexually explicit material may lead people to devalue their relationships. Imagined stimuli (dreams and fantasies) also influence sexual arousal.
Multiple-Choice Questions

1. Which of the following best describes the relationship between gender and orgasm?
   a. You can use fMRIs to identify when orgasm occurs in men, but this method is unreliable in women.
   b. Men describe orgasm in physical terms and women describe orgasm in emotional terms.
   c. Orgasm activates subcortical regions in men and cortical regions in women.
   d. Men and women describe orgasm similarly.
   e. Orgasm serves evolutionary purposes in women but not in men.

2. About _______ percent of the population experience sexual fantasies.
   a. 95
   b. 68
   c. 50
   d. 35
   e. 20

Practice FRQs

1. Describe one influence on sexual motivation from each of the following categories:
   a. Biological
   b. Psychological
   c. Social-cultural

   Answer
   1 point: Biological: hormones, sexual orientation.
   1 point: Psychological: exposure to sexually stimulating material, fantasizing.
   1 point: Social-cultural: religious and personal values, media.

2. Name and briefly describe the four stages of the sexual response cycle identified by Masters and Johnson.

   Answer to Practice FRQ 2

   1 point: Excitement, where physical changes occur to ready the body for sexual activity.
   1 point: Plateau, where sexual excitement is at a peak.
   1 point: Orgasm, characterized by sexual release and muscle contractions throughout the body.
   1 point: Resolution, where the body returns to normal.
TEACH Discussion Starter
Use the Module 40 Fact or Falsehood activity from the TRM to introduce the concepts from this module.

TEACH Concept Connections
Erik Erikson’s theory of psychosocial development (discussed in Unit IX) addressed the need to belong during the stage of young adulthood. In the intimacy versus isolation stage, adults must find meaningful relationships or feel isolated from their peers and society. Typically, this intimacy is found in marriage, but adults who do not marry can develop these types of relationships with close friends, family members, or colleagues.

Module 40
Social Motivation: Affiliation Needs

Module Learning Objectives
40-1 Describe the evidence that points to our human affiliation need—our need to belong.
40-2 Describe how social networking influences us.

What evidence points to our human affiliation need—our need to belong?
The social stigma attached to obesity may bother an overweight person as much as, or more than, the health concerns. Why? We are what Greek philosopher Aristotle called the social animal. Cut off from friends or family—alone in prison or at a new school or in a foreign land—most people feel keenly their lost connections with important others. This deep need to belong—our affiliation need—seems to be a basic human motivation (Baumeister & Leary, 1995). Although healthy people vary in their wish for privacy and solitude, most of us seek to affiliate with others, even to become strongly attached to certain others in enduring, close relationships. Human beings, contended personality theorist Alfred Adler, have an “urge to community” (Ferguson, 1989, 2001, 2010). Our psychological needs drive our adaptive behaviors and, when satisfied, enhance our psychological well-being (Sheldon, 2011).

The Benefits of Belonging
Social bonds boosted our early ancestors’ chances of survival. Adults who formed attachments were more likely to reproduce and to co-nurture their offspring to maturity. Attachment bonds helped keep those children close to their caregivers, protecting them from many threats. Indeed, to be “wretched” (literally means, in its Middle English origin terebre), to be without kin nearby.

Cooperation also enhanced survival. In solo combat, our ancestors were not the toughest predators. But as hunters, they learned that six hands were better than two. As food gatherers, they gained protection from two-footed and four-footed enemies by traveling in groups. Those who felt a need to belong survived and reproduced most successfully, and their genes now predominate. We are innately social creatures. People in every society on Earth belong to groups and (as Module 77 explains) prefer and favor “us” over “them.”

Do you have close friends—people with whom you freely disclose your ups and downs? Having someone who rejoices with us over good news helps us feel even better about the good news, as well as about the friendship (Reis et al., 2010). The need to belong runs deeper, it seems, than the need to be rich. One study found that very happy university students were distinguished not by their money but by their “rich and satisfying close relationships” (Diener & Seligman, 2002).
The need to belong colors our thoughts and emotions. We spend a great deal of time thinking about actual and hoped-for relationships. When relationships form, we often feel joy. Falling in mutual love, people have been known to feel their cheeks ache from their irrepressible grins. Asked, “What is necessary for your happiness?” or “What is it that makes your life meaningful?” most people have mentioned—before anything else—close, satisfying relationships with family, friends, or romantic partners (Berscheid, 1985). Happiness hits close to home.

Consider: What was your most satisfying moment in the past week? Researchers asked that question of American and South Korean collegians, then asked them to rate how much that moment had satisfied various needs (Sheldon et al., 2001). In both countries, the peak moment had contributed most to satisfaction of self-esteem and relatedness-belonging needs. When our need for relatedness is satisfied in balance with two other basic psychological needs—autonomy (a sense of personal control) and competence—we experience a deep sense of well-being, and our self-esteem rides high (Deci & Ryan, 2002, 2009; Miyavskaya et al., 2009; Sheldon & Niemiec, 2006). Indeed, self-esteem is a gauge of how valued and accepted we feel (Leary et al., 1998).

Is it surprising, then, that so much of our social behavior aims to increase our feelings of belonging? To gain acceptance, we generally conform to group standards. We monitor our behavior, hoping to make a good impression. We spend billions on clothes, cosmetics, and diet and fitness aids—all motivated by our search for love and acceptance.

By drawing a sharp circle around “us,” the need to belong feeds both deep attachments and menacing threats. Out of our need to define a “we” come loving families, faithful friendships, and team spirit, but also teen gangs, ethnic rivalries, and fanatical nationalism.

For good or for bad, we work hard to build and maintain our relationships. Familiarity breeds liking, not contempt. Thrown together in groups at school, at band camp, on a hiking trip, we behave like magnets, moving closer, forming bonds. Parting, we feel distress. We promise to call, to write, to come back for reunions. This happens in part because feelings of love activate brain reward and safety systems. In one experiment involving exposure to heat, deeply-in-love university students felt markedly less pain when looking at their beloved’s picture (rather than viewing someone else’s photo or being distracted by a word task) (Younger et al., 2010). Pictures of our loved ones also activate a brain region associated with safety—the prefrontal cortex—that dampens feelings of physical pain (Eisenberger et al., 2011). Love is a natural painkiller.

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Even when bad relationships break, people suffer. In one 16-nation survey, and in repeated U.S. surveys, separated and divorced people have been half as likely as married people to say they were “very happy” (Inglehart, 1990, NORC, 2010). After such separations, loneliness and anger—and sometimes even a strange desire to be near the former partner—linger. For those in abusive relationships, the fear of being alone sometimes seems worse than the certainty of emotional or physical pain.

Children who move through a series of foster homes or through repeated family relocations know the fear of being alone. After repeated disruption of budding attachments, they may have difficulty forming deep attachments (Oishi & Schimmack, 2010b). The evidence is clearest at the extremes—the children who grow up in institutions without a sense of belonging to anyone, or who are locked away at home and severely neglected. Too many become withdrawn, frightened, speechless. Feeling insecurely attached to others during childhood can persist into adulthood, in two main forms (Fraley et al., 2011). Some display insecure anxious attachment, constantly craving acceptance but remaining vigilant to signs of possible rejection. Others are trapped in insecure avoidant attachment, feeling such discomfort over getting close to others that they employ avoidance strategies to maintain their distance.
No matter how secure our early years were, we all experience anxiety, loneliness, jealousy, or guilt when something threatens or dissolves our social ties. Much as life’s best moments occur when close relationships begin—making a new friend, falling in love, having a baby—life’s worst moments happen when close relationships end (Jaremka et al., 2013). Bereaved, we may feel life is empty, pointless. Even the first weeks living on a college campus away from home can be distressing.

For immigrants and refugees moving alone to new places, the stress and loneliness can be depressing. After years of placing individual families in isolated communities, U.S. immigration policies began to encourage chain migration (Pipher, 2002). The second refugee Sudanese family settling in a town generally has an easier adjustment than the first.

Social isolation can put us at risk for mental decline and ill health (Cacioppo & Hawkley, 2009). But if feelings of acceptance and connection increase, so will self-esteem, positive feelings, and the desire to help rather than hurt others (Blackhart et al., 2009; Buckley & Leary, 2003).

The Pain of Being Shut Out

Can you recall feeling excluded or ignored or shunned? Perhaps you received the silent treatment. Perhaps people avoided you or averted their eyes in your presence or even mocked you behind your back. It’s the meanest thing you can do to someone, especially if you know they can’t fight back. I never should have been born,” said Lea, a lifelong victim of the silent treatment by her mother and grandmother. Like Lea, people often respond to ostracism with depressed moods, initial efforts to restore their acceptance, and then withdrawal. After two years of silent treatment by his employer, Richard reported, “I came home every night and cried. I lost 25 pounds, had no self-esteem and felt that I wasn’t worthy.”

To experience ostracism is to experience real pain, as social psychologist Kipling Williams and his colleagues were surprised to discover in their studies of cyber-ostracism (Goncalo-Rotter & Williams, 2010). (Perhaps you can recall the feeling of being unfriended or having few followers on a social networking site, being ignored in a chat room, or having a text message or e-mail go unanswered.) Such ostracism, they discovered, takes a toll. It elicits increased activity in brain areas, such as the anterior cingulate cortex, that also activate in response to physical pain (Kross et al., 2011; Lieberman & Eisenberger, 2009). That helps explain another surprising finding: The pain reliever acetaminophen (as in Tylenol and Anacin) lessens social as well as physical pain (DeWall et al., 2010). Across cultures, people use the same words (for example, hurt, crushed) for social pain and physical pain (MacDonald & Leary, 2009). Psychologically, we seem to experience social pain with the same emotional unpleasantness that marks physical pain.
Pain, whatever its source, focuses our attention and motivates corrective action. Rejected and unable to remedy the situation, people may seek new friends or relieve stress in a strengthened religious faith (Aydin et al., 2010). Or they may turn nasty. In a series of experiments, researchers (Baumeister et al., 2002; Twenge et al., 2001, 2002, 2007) told some students (who had taken a personality test) that they were “the type likely to end up alone later in life,” or that people they had met didn’t want them in a group that was forming. They told other students that they would have “rewarding relationships throughout life,” or that “everyone chose you as someone they’d like to work with.” Those excluded became much more likely to engage in self-defeating behaviors and to underperform on aptitude tests. The rejection also interfered with their empathy for others and made them more likely to act in disparaging or aggressive ways against those who had excluded them (blasting them with noise, for example). “If intelligent, well-adjusted, successful . . . students can turn aggressive in response to a small laboratory experience of social exclusion,” noted the research team, “it is disturbing to imagine the aggressive tendencies that might arise from . . . chronic exclusion from desired groups in actual social life.” Indeed, as Williams (2007) has observed, ostracism “weaves through case after case of school violence.”

Social Acceptance and Rejection
Successful participants on the reality TV show Survivor form alliances and gain acceptance among their peers. The rest receive the ultimate social punishment as they are “voted off the island.”

Connecting and Social Networking

How does social networking influence us?

As social creatures, we live for connection. Asked what he had learned from studying 238 Harvard University men from the 1930s to the end of their lives, researcher George Vaillant (2009) replied, “The only thing that really matters in life are your relationships to other people.” A South African Zulu saying captures the idea: Umuntu ngumuntu ngabantu—”a person is a person through other persons.”

Mobile Networks and Social Media

Look around and see humans connecting: talking, texting, posting, chatting, social gaming, e-mailing. The changes in how we connect have been fast and vast:

• Cell phones have been history’s most rapidly adopted technology. At the end of 2010, the world had 7.1 billion people and 6.8 billion mobile cell-phone subscriptions (ITU, 2013). Asia and Europe have lead the way. In 2012 in India, 925 million people had mobile phone access—more than had a home toilet (Krishna, 2012; Mishra, 2013). American youth have kept up with the world. In 2013, 78 percent of 12- to 17-year-olds were cell-phone users (Pew, 2013).

AP® Exam Tip

Free-response questions on the AP® exam often ask students to apply psychological principles to real-life situations. It’s easy to imagine a question that deals with social media.

“There’s no question in my mind about what stands at the heart of the communication revolution—this human desire to connect.”
—Skype President Josh Silverman, 2009

Active Learning

Have students interview their parents and grandparents about the social connections they maintained when they were teenagers. Propose that students ask some of the following questions:

• What were the rules for using the phone in your home?
• In what ways did you communicate with your friends during the day when you were in high school?
• Did you keep a diary or journal? If so, what did you write about? Did you ever share the diary with your friends?
ENGAGE
Active Learning
Have students conduct a survey on which social networking sites their peers prefer (Facebook, Twitter, Instagram, etc.). Have them ask how often a day they check and use the platforms. Students should also find out how many of those surveyed have actually met their followers or friends in person.

ENGAGE
Active Learning
Ask students to assess their own social networking usage and habits. Have them pick the one social networking platform they use most often and conduct an analysis of their habits there:
- How many friends or followers do they have?
- How many of those people do they know personally (have met at least once in person)?
- Who is the friend/follower who lives the farthest away? Who lives the closest?
- How often do they communicate with their parents/siblings using this platform?
- Who among their friends/followers would they most want to spend “in-person” time with? Have they ever hung out with that person?

Texting and e-mailing have been displacing phone talking, which by 2009 accounted for less than half of U.S. mobile network traffic (Wortham, 2010). In Canada and elsewhere, e-mailing has declined, displaced by texting, Facebook, and other messaging technology (IPSOS, 2010a). Speedy texting is not really writing, said one observer (McWhorter, 2012), but rather a new form of conversation—“fingered speech.”

For many, it’s as though friends, for better or worse, are always present. How many of us are using social networking sites, such as Facebook or Twitter? Among 2010’s entering American collegians, 94 percent were (Pryor et al., 2011). With a “critical mass” of your friends on a social network, its lure becomes hard to resist. Such is our need to belong. Check in or miss out.

The Social Effects of Social Networking
By connecting like-minded people, the Internet serves as a social amplifier. It also functions as an online dating matchmaker (more on those topics in Module 79). As electronic communication has become part of our “new normal,” researchers have explored how these changes have affected our relationships.

HAVE SOCIAL NETWORKING SITES MADE US MORE, OR LESS, SOCIALLY ISOLATED?
In the Internet’s early years, when online communication in chat rooms and during social games was mostly between strangers, the adolescents and adults who spent more time online spent less time with friends (Kraut et al., 1998; Mesch, 2001; Nie, 2003). As a result, their offline relationships suffered. Even in more recent times, lonely people have tended to spend greater-than-average time online (Bonetti et al., 2010; Stepankova et al., 2010). Social networkers have been less likely to know their real-world neighbors and “64 percent less likely than non-Internet users to rely on neighbors for help in caring for themselves or a family member” (Pew, 2009).

But the Internet has also diversified our social networks. I am now connected to other hearing-technology advocates across the world and perhaps you, too, have found a group of kindred spirits online. Despite the decrease in neighborliness, social networking seems mostly to have strengthened our connections with people we already know (DiSalvo, 2010; Valkenburg & Peter, 2009). If your social networking helps you connect with friends, stay in touch with extended family, or find support in facing challenges, then you are not alone (Rainie et al., 2011). For many, though, being alone is not the problem. If you are like other students, two days of social networking deprivation would be followed by a glut of online time, much as you would eat voraciously after a two-day fast (Sheldon et al., 2011). Social networks connect us, but they can also become gigantic time- and attention-sucking diversions. For some research-based strategies, see Close-up: Managing Your Social Networking.
Based on Facebook profiles were much closer to the participants' Facebook profiles to create an independent set of personality ratings. The ratings in the other, they described their personality. Generally, however, social networks reveal people's real personalities. In one study, we've all heard stories of Internet predators hiding behind false personalities, values, and motives. Sometimes this is taken to an extreme, as when teens send photos of themselves they later regret, or hate groups post messages promoting bigotry or crimes. More often, however, the increased self-disclosure serves to deepen friendships (Valkenburg & Peter, 2009).

Although electronic networking pays dividends, nature has designed us for face-to-face communication, which appears to be the better predictor of life satisfaction (Killingsworth & Gilbert, 2010; Lee et al., 2011). Texting and e-mailing are rewarding, but eye-to-eye conversation with family and friends is even more so.

**Managing Your Social Networking**

In today's world, each of us is challenged to find a healthy balance between our real-world time with people and our online sharing. In both Taiwan and the United States, excessive online socializing and gaming have been associated with lower grades (Chen & Fu, 2008; Kaiser Family Foundation, 2010). In one U.S. survey, 47 percent of the heaviest users of the Internet and other media were receiving mostly C grades or lower, as were just 23 percent of the lightest users (Kaiser Family Foundation, 2010). The heaviest users may be almost constantly connected, sometimes even awakening during the night long enough to reply to a text but not long enough to remember it the next day. If you're trying to maintain a healthy balance between online connecting and real-world responsibilities, experts offer these practical suggestions:

- **Monitor your time.** Keep a log of how you use your time. Then ask yourself, "Does my time use reflect my priorities? Am I spending more time online than I intended? Is my time online interfering with school or work performance? Have family or friends commented on this?"
- **Monitor your feelings.** Ask yourself, "Am I emotionally distracted by online preoccupations? When I disconnect and move on to another activity, how do I feel?"
- **"Hide" your more distracting online friends.** And in your own postings, practice the golden rule. Before you post, ask yourself, "Is this something I'd care about reading if someone else posted it?"
- Try turning off your mobile devices or leaving them elsewhere. Selective attention—the flashlight of your mind—can be in only one place at a time. When you want to study or work productively, squelch the temptation to check for messages, posts, or e-mails. And disable sound alerts and pop-ups. These distractions can interrupt your work and hijack your attention just when you've managed to get focused.
- Try a social networking fast (give it up for an hour, a day, or a week) or a time-controlled social media diet (check in only after homework is done, or only during a predetermined break). Take notes on what you're losing and gaining on your new "diet."
- Replenish your focus with a nature walk. University of Michigan researchers have reported that a walk in the woods, unlike walking on a busy street, replenishes people's capacity for focused attention (Berman et al., 2008). People learn better after a peaceful walk that restores their fatigued attention.

**DOES ELECTRONIC COMMUNICATION STIMULATE HEALTHY SELF-DISCLOSURE?**

As we will see in Module 84, confiding in others can be a healthy way of coping with day-to-day challenges. When communicating electronically rather than face to face, we often are less focused on others' reactions, less self-conscious, and thus less inhibited. We become more willing to share joys, worries, and vulnerabilities. Sometimes this is taken to an extreme, as when teens send photos of themselves they later regret, or hate groups post messages promoting bigotry or crimes. More often, however, the increased self-disclosure serves to deepen friendships (Valkenburg & Peter, 2009).

Although electronic networking pays dividends, nature has designed us for face-to-face communication, which appears to be the better predictor of life satisfaction (Killingsworth & Gilbert, 2010; Lee et al., 2011). Texting and e-mailing are rewarding, but eye-to-eye conversation with family and friends is even more so.

**DO SOCIAL NETWORKING PROFILES AND POSTS REFLECT PEOPLE'S ACTUAL PERSONALITIES?**

We've all heard stories of Internet predators hiding behind false personalities, values, and motives. Generally, however, social networks reveal people's real personalities. In one study, participants completed a personality test twice. In one test, they described their “actual personality”; in the other, they described their “ideal self.” Volunteers then used the participants’ Facebook profiles to create an independent set of personality ratings. The ratings based on Facebook profiles were much closer to the participants’ actual personalities than to....

**ENGAGE**

**Active Learning**

Have students conduct an assessment like the one suggested in the Close-up box.

- How much time do they spend on social media each day?
- How emotionally distracted are they when using social media?
- How many posts do students make that they would characterize as “important”?
- How often do they turn off their mobile devices?
- Have they ever gone on a social-networking fast? If so, for how long? If not, why?
- Have students ever taken a nature walk without their mobile devices? If so, how did that separation make them feel? If not, why?

**ENGAGE**

**Critical Questions**

Ask students if they have shared something over social media that they later regretted. What was the impact of such oversharing? Have they ever counseled a younger sibling or friend on the pitfalls of oversharing? What advice would they give if asked?
CLOSE & ASSESS

Exit Assessment
Have students discuss the effects of belonging and the effects of ostracism. Allow them to use the studies described in the text to support their arguments.

their ideal personalities (Back et al., 2010). In another study, people who seemed most likeable on their Facebook page also seemed most likeable in face-to-face meetings (Weisbuch et al., 2009). Your online profiles may indeed reflect the real you!

**DOES SOCIAL NETWORKING PROMOTE NARCISSISM?** Narcissism is self-esteem gone awry. Narcissistic people are self-important, self-focused, and self-promoting. Some personality tests assess narcissism with items such as: “I like to be the center of attention.” Given our constant social comparison—our measuring ourselves against others—many social networkers can’t resist comparing numbers of friends. (Evolutionary psychologist Robin Dunbar [1992, 2010] estimates we can have meaningful, supportive relationships with about 150 people—a typical size of tribal villages.)

Those who score high on narcissism are especially active on social networking sites. They collect more superficial “friends.” They offer more staged, glamorous photos. And, not surprisingly, they seem more narcissistic to strangers viewing their pages (Buffardi & Campbell, 2008).

For narcissists, social networking sites are more than a gathering place; they are a feeding trough. In one study, college students were randomly assigned either to edit and explain their online profiles for 15 minutes, or to use that time to study and explain a Google Maps routing (Freeman & Twenge, 2010). After completing their tasks, all were tested. Who then scored higher on a narcissism measure? Those who had spent the time focused on themselves.

* * *

We have seen that identifiable physiological mechanisms drive some motives, such as hunger (though learned tastes and cultural expectations matter, too). Other motives, such as our need for affiliation, are more obviously driven by psychological factors, such as the social rewards that come from belonging. What unifies all motives is their common effect: the energizing and directing of behavior.

Before You Move On

**ASK YOURSELF**

Have there been times when you felt out of the loop with family and friends, or even ostracized by them? How did you respond?

**TEST YOURSELF**

How might the evolutionary perspective, drive-reduction theory, and arousal theory explain our affiliation needs?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.
Module 40 Review

40-1 What evidence points to our human affiliation need—our need to belong?

- Our need to affiliate or belong—to feel connected and identified with others—had survival value for our ancestors, which may explain why humans in every society live in groups.
- Because of their need to belong, people suffer when socially excluded, and they may engage in self-defeating behaviors (performing below their ability) or in antisocial behaviors.
- Feeling loved activates brain regions associated with reward and safety systems.
- Social isolation can put us at risk mentally and physically.

40-2 How does social networking influence us?

- We connect with others through social networking, strengthening our relationships with those we already know.
- When networking, people tend toward increased self-disclosure.
- Working out strategies for self-control and disciplined use can help people maintain a healthy balance between social networking and school and work performance.

Multiple-Choice Questions

1. If you are trying to maintain a healthy balance between connecting with others online and a real-world perspective, which of the following suggestions should you follow?
   a. Monitor your feelings.
   b. Dismiss the notion of logging online time.
   c. Interact often with your more distracting online friends.
   d. Decrease physical activity.
   e. Try a social networking marathon.

2. Which of the following statements about mobile networks and social media is accurate?
   a. There are more home toilets in India than there are cell phones.
   b. Cell phones have been history’s most rapidly adopted technology.
   c. Fewer than 75 percent of American youth are cell-phone users.
   d. Phone calling has displaced texting.
   e. Testing has declined in Canada and elsewhere because of e-mail.

3. Which of the following words or phrases best identifies our gauge of how valued and accepted we feel?
   a. Hope
   b. Autonomy
   c. Competence
   d. Self-esteem
   e. Ostracism

Practice FRQs

1. Explain three potentially negative effects of social networking.

   Answer
   1 point each for explaining any of the following:
   - Isolates us from others
   - Can become a time-sucking diversion
   - Can become an attention-sucking diversion
   - People may self-disclose too much
   - Can make us feel emotionally distracted
   - Other effects (use teacher discretion)

2. Explain three things you can do to manage your social networking.

   Answer
   (3 points)
   - Monitor your time.
   - Monitor your feelings.
   - Hide your more distracting online friends.
   - Turn off your mobile device.
   - Take a social networking break.
   - Replenish your focus with exercise.
Motivated behavior often is driven by powerful emotions that color and sometimes disrupt our lives. I will never forget the day I went to a huge store to drop off film and brought along Peter, my toddler first-born child. As I set Peter down on his feet and prepared to complete the paperwork, a passerby warned, "You'd better be careful or you'll lose that boy!" Not more than a few breaths later, after dropping the film in the slot, I turned and found no Peter beside me.

With mild anxiety, I peered around one end of the counter. No Peter in sight. With slightly more anxiety, I peered around the other end. No Peter there, either. Now, with my heart accelerating, I circled the neighboring counters. Still no Peter anywhere. As anxiety turned to panic, I began racing up and down the store aisles. He was nowhere to be found. 

Apprised of my alarm, the store manager used the public-address system to ask customers to assist in looking for a missing child. Soon after, I passed the customer who had warned me. "I told you that you were going to lose him!" he now scorned. With visions of kidnapping (strangers routinely adored that beautiful child), I braced for the possibility that my negligence had caused me to lose what I loved above all else, and that I might have to return home and face my wife without our only child.

But then, as I passed the customer service counter yet again, there he was, having been found and returned by some obliging customer. In an instant, the arousal of terror spilled into ecstasy. Clutching my son, with tears suddenly flowing, I found myself unable to speak my thanks and stumbled out of the store awash in grateful joy.
Where do such emotions come from? Why do we have them? What are they made of? Emotions don’t exist just to give us interesting experiences. They are our body’s adaptive response, increasing our chances of survival. When we face challenges, emotions focus our attention and energize our actions (Cyders & Smith, 2010). Our heart races. Our pace quickens. All our senses go on high alert. Receiving unexpected good news, we may find our eyes tearing up. We raise our hands triumphantly. We feel elation and a newfound confidence. Yet negative and prolonged emotions can harm our health.

Cognition and Emotion

How do arousal and expressive behaviors interact in emotion?

As my panicked search for Peter illustrates, emotions are a mix of bodily arousal (heart pounding), expressive behaviors (quickened pace), and conscious experience, including thoughts (“Is this a kidnapping?”) and feelings (panic, fear, joy).

The puzzle for psychologists is figuring out how these three pieces fit together. To do that, we need answers to two big questions:

• A chicken-and-egg debate: Does your bodily arousal come before, after, or at the same time as your emotional feelings? (Did I first notice my racing heart and faster step, and then feel terror about losing Peter? Or did my sense of fear come first, stirring my heart and legs to respond?)

• How do thinking (cognition) and feeling interact? Does cognition always come before emotion? (Did I think about a kidnapping threat before I reacted emotionally?)

Historical Emotion Theories

JAMES-LANGE THEORY: AROUSAL COMES BEFORE EMOTION

Common sense tells most of us that we cry because we are sad, lash out because we are angry, tremble because we are afraid. First comes conscious awareness, then the feeling. But to pioneering psychologist William James, this commonsense view of emotion had things backwards. Rather, “We feel sorry because we cry, angry because we strike, afraid because we tremble” (1890, p. 1066). James’ idea was also proposed by Danish physiologist Carl Lange, and so is called the James-Lange theory.

James-Lange theory: the theory that our experience of emotion is our awareness of our physiological responses to emotion-arousing stimuli.

Joy expressed According to the James-Lange theory, we don’t just smile because we share our teammates’ joy. We also share the joy because we are smiling with them.

Theories of emotion can be difficult to keep straight. Each theory uses the same terminology to discuss emotions—namely, physiological arousal and cognitive labeling. These concepts, however, are presented in different orders, depending on the theory. Help students organize the theories by using the following mnemonic:

• Cannon–Bard theory: The physiological reaction and the cognitive label happen simultaneously. These processes are directly connected, just like the letters C and B are directly next to each other in the alphabet.

• James–Lange theory: The physiological response comes before the cognitive label, just like J comes before L in the alphabet.


ENGAGE

Enrichment

William James has long been considered one of the greatest minds in psychology, even though he never took a course in this field. He wrote the first textbook of psychology, Principles of Psychology; taught the first course in psychology offered in the United States (at Harvard); and conducted experiments in psychology about the same time as Wilhelm Wundt (the widely regarded “father of psychology”). Yet, James hated doing experiments because he found them tedious and dismissed being called a “psychologist.” And not only was he related to Walter Cannon, his brother was the famous author Henry James.
CANNON-BARD THEORY: AROUSAL AND EMOTION OCCUR SIMULTANEOUSLY

Physiologist Walter Cannon (1871–1945) disagreed with James and Lange. Does a racing heart signal fear or anger or love? The body’s responses—heart rate, perspiration, and body temperature—are too similar, and they change too slowly, to cause the different emotions, said Cannon. He, and later another physiologist, Philip Bard, concluded that our bodily responses and experienced emotions occur separately but simultaneously. So, according to the Cannon-Bard theory, my heart began pounding as I experienced fear. The emotion-triggering stimulus traveled to my sympathetic nervous system, causing my body’s arousal. At the same time, it traveled to my brain’s cortex, causing my awareness of my emotion. My pounding heart did not cause my feeling of fear, nor did my feeling of fear cause my pounding heart.

The Cannon-Bard theory has been challenged by studies of people with severed spinal cords, including a survey of 25 soldiers who suffered such injuries in World War II (Hohman, 1966). Those with lower-spine injuries, who had lost sensation only in their legs, reported little change in their emotions’ intensity. Those with high spinal cord injury, who could feel nothing below the neck, did report changes. Some reactions were much less intense than before the injuries. Anger, one man confessed, “just doesn’t have the heat to it that it used to. It’s a mental kind of anger.” Other emotions, those expressed mostly in body areas above the neck, were felt more intensely. These men reported increases in weeping, lumps in the throat, and getting choked up when saying good-bye, worshipping, or watching a touching movie. Our bodily responses seemingly feed our experienced emotions.

But most researchers now agree that our emotions also involve cognition (Averill, 1993; Barrett, 2006). Whether we fear the man behind us on the dark street depends entirely on whether we interpret his actions as threatening or friendly.

Cognition Can Define Emotion: Schachter and Singer

Stanley Schachter and Jerome Singer (1962) believed that an emotional experience requires a conscious interpretation of arousal. Our physical reactions and our thoughts (perceptions, memories, and interpretations) together create emotion. In their two-factor theory, emotions therefore have two ingredients: physical arousal and cognitive appraisal.

Consider how arousal spills over from one event to the next. Imagine arriving home after an invigorating run and finding a message that you got a longed-for job. With arousal lingering from the run, would you feel more elated than if you received this news after awakening from a nap?

To explore this spillover effect, Schachter and Singer injected college men with the hormone epinephrine, which triggers feelings of arousal. Picture yourself as a participant: After receiving the injection, you go to a waiting room, where you find yourself with another person (actually an accomplice of the experimenters) who is acting either euphoric or irritated. As you observe this person, you begin to feel your heart race, your body flush, and your breathing become more rapid. If you had been told to expect these effects from the injection, what would you feel? The actual volunteers felt little emotion—because they attributed their arousal to the drug. But if you had been told the injection would produce no effects, what would you feel? Perhaps you would react as another group of participants did. They “caught” the apparent emotion of the other person in the waiting room. They became happy if the accomplice was acting euphoric, and testy if the accomplice was acting irritated.
This discovery—that a stirred-up state can be experienced as one emotion or another, depending on how we interpret and label it—has been replicated in dozens of experiments (Reisenzein, 1983; Sinclair et al., 1994; Zillmann, 1986). As researcher Daniel Gilbert (2006) has noted, “Feelings that one interprets as fear in the presence of a sheer drop may be interpreted as lust in the presence of a sheer blouse.” The point to remember: Arousal fuels emotion; cognition channels it.

Cognition May Not Precede Emotion: Zajonc, LeDoux, and Lazarus

But is the heart always subject to the mind? Must we always interpret our arousal before we can experience an emotion? Robert Zajonc (1980, 1984a) contended that we actually have many emotional reactions apart from, or even before, our interpretation of a situation. Perhaps you can recall liking something or someone immediately, without knowing why.

In earlier modules, we noted that when people repeatedly view stimuli flashed too briefly for them to interpret, they come to prefer those stimuli. Unaware of having previously seen them, they nevertheless rather like them. We have an acutely sensitive automatic radar for emotionally significant information, such that even a subliminally flashed stimulus can prime us to feel better or worse about a follow-up stimulus (Murphy et al., 1995; Zeelenberg et al., 2006). In experiments, thirsty people were given a fruit-flavored drink after viewing a subliminally flashed (thus unperceived) face. Those exposed to a happy face drank about 50 percent more than those exposed to a neutral face (Berridge & Winkielman, 2003). Those flashed an angry face drank substantially less.

Neuroscientists are charting the neural pathways of both “bottom-up” and “top-down” emotions (Ochsner et al., 2009). Our emotional responses can follow two different brain pathways. Some emotions (especially more complex feelings like hatred and love) travel a “high road.” A stimulus following this path would travel (by way of the thalamus) to the brain’s cortex (Figure 41.1a). There, it would be analyzed and labeled before the command is sent out, via the amygdala (an emotion-control center), to respond.

But sometimes our emotions (especially simple likes, dislikes, and fears) take what Joseph LeDoux (2002) has called the “low road,” a neural shortcut that bypasses the cortex. Following the low-road pathway, a fear-provoking stimulus would travel from the eye or ear (again via the thalamus) directly to the amygdala (Figure 41.1b). This shortcut, bypassing the cortex, enables our greased-lightning emotional response before our intellect intervenes. Like speedy

**Figure 41.1**

The brain’s pathways for emotions. In the two-track brain, sensory input may be routed (a) to the cortex (via the thalamus) for analysis and then transmission to the amygdala, or (b) directly to the amygdala (via the thalamus) for an instant emotional reaction.

The amygdala is part of the limbic system of the brain (see Unit II). Along with the amygdala, the hippocampus and the basal ganglia make up this structure. A scientist named James Papez (rhymes with “apes”) theorized that this part of the brain was responsible for the expression of emotion, so the region was originally called Papez circuit.
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ENGAGE

Enrichment

Ralph Adolphs and his colleagues at the University of Iowa reported on the case of a 30-year-old woman known as S. M., who seemed to know no fear and had trouble seeing it in others. A rare genetic disorder had destroyed the amygdala in this otherwise healthy woman. When Adolphs showed her dozens of photographs of common facial expressions, she could readily identify pure happiness, disgust, and surprise. However, she had difficulty identifying mixed emotions. Fearful expressions mystified her completely. Judging from the woman’s responses in follow-up conversation, Adolphs suspected that she not only failed to recognize fear but also did not feel it at a gut level. S. M. became adroit at recognizing rationally when she should be afraid based on cues such as loud voices, dark alleys, or speeding cars and thus managed to stay out of harm’s way. Because everyday life is rich with such signals, the woman functioned fairly normally and claimed to not feel at all impaired.


TEACH

Concept Connections

Link Robert Zajonc’s arguments to a discussion of reflexes. Because reflexes work by passing on messages that control movement before processing in the brain occurs, we can avoid dangerous situations without having to take the time to think about them.
As we saw in Module 10, in a crisis, the responses are easy to notice. Other emotional responses we experience without awareness involve the body. Feeling without a body is like breathing without lungs. Some physical embodied responses happen instantly, without conscious appraisal.

**Table 41.1 Summary of Emotion Theories**

<table>
<thead>
<tr>
<th>Theory</th>
<th>Explanation of Emotions</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>James-Lange</td>
<td>Emotions arise from our awareness of our specific bodily responses to emotion-arousing stimuli.</td>
<td>We observe our heart racing after a threat and then feel afraid.</td>
</tr>
<tr>
<td>Cannon-Bard</td>
<td>Emotion-arousing stimuli trigger our bodily responses and simultaneous subjective experience.</td>
<td>Our heart races at the same time that we feel afraid.</td>
</tr>
<tr>
<td>Schachter-Singer</td>
<td>Our experience of emotion depends on two factors: general arousal and a conscious cognitive label.</td>
<td>We may interpret our arousal as fear or excitement, depending on the context.</td>
</tr>
<tr>
<td>Zajonc; LeDoux</td>
<td>Some embodied responses happen instantly, without conscious appraisal.</td>
<td>We automatically feel startled by a sound in the forest before labeling it as a threat.</td>
</tr>
<tr>
<td>Lazarus</td>
<td>Cognitive appraisal (“Is it dangerous or not?”)—sometimes without our awareness—defines emotion.</td>
<td>The sound is “just the wind.”</td>
</tr>
</tbody>
</table>

**Before You Move On**

**ASK YOURSELF**
Can you remember a time when you began to feel upset or uneasy and only later labeled those feelings?

**TEST YOURSELF**
Christine is holding her 8-month-old baby when a fierce dog appears out of nowhere and, with teeth bared, leaps for the baby’s face. Christine immediately ducks for cover to protect the baby, screams at the dog, then notices that her heart is pounding in her chest and she’s broken out in a cold sweat. How would the James-Lange, Cannon-Bard, and two-factor theories explain Christine’s emotional reaction?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

**Embodied Emotion**

Whether you are falling in love or grieving a death, you need little convincing that emotions involve the body. Feeling without a body is like breathing without lungs. Some physical responses are easy to notice. Other emotional responses we experience without awareness.

**Emotions and the Autonomic Nervous System**

**ENGAGE**

**Enrichment**

Another emotion theory is Richard Solomon’s opponent-process theory, which states that every emotion triggers an opposing emotion that fights it. Each time we feel a positive emotion, we will, after a while, feel a negative emotion. Each time we feel a negative emotion, we will later feel an opposing positive emotion. Opponent-process theory suggests that most motivation is learned via a pattern of opposing emotions and, in fact, becomes addictive. This includes the need not only for drugs but also for sauna bathing, parachuting, and even social attachment among ducklings.


**ENGAGE**

**Active Learning**

Richard Lazarus studied the importance of preparing a person for emotion. He and his associates documented that a person’s emotional reactions to a film on a painful event could be lessened if the event in the upcoming viewing were described in a matter-of-fact way, or the emotional reactions could be heightened if he and his associates emphasized the pain the subject would experience.

- How could this research be used by doctors to help their patients before surgery?
- How can parents use this research to help rear their children?
- How could activists use this information to motivate people to join a cause?

**ENGAGE**

**Enrichment**

Lazarus conducted experiments using mild electrical shock on his patients. He noticed that they would react to the shock without realizing it. He called this ability to react emotionally without conscious awareness subception.

**ENGAGE**

**Active Learning**

Blow up several balloons and secure a stick pin so you can pop them. Replicate the procedure Lazarus used to prepare people for emotional reactions. Establish a baseline reaction by popping one balloon at a random moment, catching the class off-guard. Then run one trial in which you explain to prepare people for emotional reactions. Establish a baseline reaction by popping one balloon at a random moment, catching the class off-guard. Then run one trial in which you explain that sound. Then run another trial in which you emphasize how painful it is to hear a balloon pop. Dramatize the “pain” as much as possible. Ask the students how they would react to the shock without realizing it. He called this ability to react emotionally without conscious awareness subception.
Teach

Concept Connections
Remind students that Figure 41.5 shows the Yerkes–Dodson curve (discussed in Module 37). This curve illustrates how stress and performance are linked. Less stress doesn’t always mean better performance. There is an ideal amount of stress, however, that leads to optimal performance.

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Figure 41.4
Emotional arousal. Like a crisis control center, the autonomic nervous system arouses the body in a crisis and calms it when danger passes.

Figure 41.5
Arousal and performance. Performance peaks at lower levels of arousal for difficult tasks, and at higher levels for easy or well-learned tasks. (1) How might this phenomenon affect runners? (2) How might this phenomenon affect anxious test-takers facing a difficult exam? (3) How might the performance of anxious students be affected by relaxation training?

Figure 41.5 Answers:
1. Runners tend to excel when aroused by competition.
2. High anxiety in test-takers may disrupt their performance.
3. Teaching anxious students how to relax before an exam can enable them to perform better (Hembree, 1988).

(FIGURE 41.4) To provide energy, your liver pours extra sugar into your bloodstream. To help burn the sugar, your respiration increases to supply needed oxygen. Your heart rate and blood pressure increase. Your digestion slows, diverting blood from your internal organs to your muscles. With blood sugar driven into the large muscles, running becomes easier. Your pupils dilate, letting in more light. To cool your stirred-up body, you perspire. If wounded, your blood would clot more quickly.

As we saw in Module 37, the Yerkes-Dodson law explains that arousal affects performance in different ways, depending on the task. When taking an exam, it pays to be moderately aroused—alert but not trembling with nervousness (FIGURE 41.5). But too little arousal (as when sleepy) can be disruptive, and, as we’ll see later in this unit, prolonged high arousal can tax the body.

When the crisis passes, the parasympathetic division of your ANS gradually calms your body, as stress hormones slowly leave your bloodstream. After your next crisis, think of this: Without any conscious effort, your body’s response to danger is wonderfully coordinated and adaptive—preparing you to fight or flight.
The Physiology of Emotions

Do different emotions activate different physiological and brain-pattern responses?

Imagine conducting an experiment measuring the physiological responses of emotion. In each of four rooms, you have someone watching a movie: In the first, the person is viewing a horror show; in the second, an anger-provoking film; in the third, a sexually arousing film; in the fourth, a boring film. From the control center you monitor each person’s perspiration, breathing, and heart rate. Could you tell who is frightened? Who is angry? Who is sexually aroused? Who is bored?

With training, you could probably pick out the bored viewer. But discerning physiological differences among fear, anger, and sexual arousal would be much more difficult (Barrett, 2006). Different emotions do not have sharply distinct biological signatures.

Nor do they engage sharply distinct brain regions. Consider the broad emotional portfolio of the insula, a neural center deep inside the brain. The insula is activated when we experience various social emotions, such as lust, pride, and disgust. In brain scans, it becomes active when people bite into some disgusting food, smell the same disgusting food, think about biting into a disgusting cockroach, or feel moral disgust over a sleazy business exploiting a saintly widow (Sapolsky, 2010).

Nevertheless, despite their similarities, sexual arousal, fear, anger, and disgust feel different to you and me, and they often look different to others. We may appear “paralyzed with fear” or “ready to explode.” Research has pinpointed some real, though subtle, physiological distinctions and brain-pattern distinctions among the emotions. For example, the finger temperatures and hormone secretions that accompany fear and rage do sometimes differ (Ax, 1953; Levenson, 1992). Fear and joy, although they prompt similar increased heart rate, stimulate different facial muscles. During fear, your brow muscles tense. During joy, muscles in your cheeks and under your eyes pull into a smile (Witvliet & Vrana, 1995).

Some emotions also differ in their brain circuits (Panksepp, 2007). Compared with observers watching angry faces, those watching (and subtly mimicking) fearful faces show more activity in their amygdala (Whalen et al., 2001). Brain scans and EEG recordings show that emotions also activate different areas of the brain’s cortex. When you experience negative emotions such as disgust, your right prefrontal cortex tends to be more active than the left. Depression-prone people, and those with generally negative personalities, also show more right frontal lobe activity (Harrington-Jones et al., 2002).

Positive moods tend to trigger more left frontal lobe activity. People with positive personalities—exuberant infants and alert, enthusiastic, energized, and persistently goal-directed adults—also show more activity in the left frontal lobe than in the right (Davidson, 2000; 2003; Ury et al., 2004). Indeed, the more a person’s baseline frontal lobe activity tilts left—or is made to tilt left by perceptual activity—the more upbeat the person typically is (Drake & Myers, 2006).

To sum up, we can’t easily see differences in emotions from tracking heart rate, breathing, and perspiration. But facial expressions and brain activity can vary with the emotion. So, do we, like Pinocchio, give off telltale signs when we lie? For more on that question, see Thinking Critically About: Lie Detection.
**ENGAGE**

**TRM | Enrichment**

Donna Desforges and Thomas Lee conducted a study that demonstrated the difficulty of detecting deception. The cues people use when actually trying to deceive are speech hesitation, increased vocal pitch, blinking, and pupil dilation. Studies at Michigan State University suggest that deceivers tend to use shorter sentences and talk for shorter durations. They also tend to make more speech errors, such as stuttering and mispronunciation. They often pause longer between words and take longer to respond to a question or comment. In addition, they frequently use a lot of hand gestures, fidget with their collars, run their fingers through their hair, or twiddle their thumbs.

Use Student Activity: Using the GSR to Detect Deception from the TRM to have students assess the physiology behind the polygraph.

**ENGAGE**

**Applying Science**

Have students research local, state, and federal laws concerning the use of polygraphs in criminal investigations. They should address the following questions:

- Have laws regarding the use of polygraphs changed due to research on their ineffectiveness?
- Why are law enforcement officials so confident in the use of polygraphs in investigations?

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A polygraph, a machine commonly used in attempts to detect lies, that measures several of the physiological responses (such as perspiration and cardiovascular and breathing changes) accompanying emotion.

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A 2002 U.S. National Academy of Sciences report noted that “no spy has ever been caught [by] using the polygraph.” It is not for lack of trying. The FBI, CIA, and Departments of Defense and Energy in the United States have tested tens of thousands of employees, and polygraph use in Europe has also increased (Mijer & Verschuere, 2010). Meanwhile Aldrich Ames, a Russian spy within the CIA, went undetected. Ames took many “polygraph tests and passed them all,” noted Robert Park (1999). “Nobody thought to investigate the source of his sudden wealth—after all, he was passing the lie detector tests.”

A more effective approach to lie detection uses a guilty knowledge test, which also assesses a suspect’s physiological responses to crime-scene details known only to the police and the guilty person (Ben-Shakhar & Elaad, 2003). If a camera and computer had been stolen, for example, only a guilty person should react strongly to the brand names of the stolen items. Given enough such specific probes, an innocent person will seldom be wrongly accused.

Research teams are now exploring new ways to nab liars. Psychologist Paul Ekman (2003) has done research (and has trained law enforcement officers) in detecting fleeting signals of deceit in facial expressions. Eyeblinks, for example, decrease during the cognitive demands of lying and increase afterward (Lael & Vrij, 2008). Other researchers are developing software that analyzes facial microexpressions (Adelson, 2004; Newman et al., 2003) or compares the language of truth-tellers and of liars (who use fewer first-person pronouns and more negative-emotion words).

“Forensic neuroscience” researchers are going straight to the seat of deceit—the brain. EEG recordings have revealed brain waves that indicate familiarity with crime information. fMRI scans have shown liars’ brains activating in places that honest people’s brains did not (Langleben et al., 2006, 2008; Lui & Rosenfeld, 2008). Phineas Gage’s giveaway signal of lying may be not the length of his nose, but rather the parietal activity in places such as his left frontal lobe and anterior cingulate cortex, which become active when the brain inhibits truth telling. A new U.S. $10 million Law and Neuroscience Project, led by psychologist Michael Gazzaniga, aims to assess appropriate uses of the new technology in identifying terrorists, convicting criminals, and protecting the
Thinking Critically About (continued)

Percentage

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<td>60%</td>
<td>50%</td>
<td>40%</td>
<td>30%</td>
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<tr>
<td>Guilty</td>
<td>70%</td>
<td>60%</td>
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</tbody>
</table>

Innocent. In 2010, a U.S. federal court declared that fMRI lie detection is not yet ready for courtroom use (Miller, 2010). Many neuroscientists concur (Gazzaniga, 2011; Wagner, 2010). Others argue that jurors’ and judges’ seat-of-the-pants judgments are worse than the science that is excluded” (Schauer, 2010).

Figure 41.6 How often do lie detection tests lie? In one study, polygraph experts interpreted the polygraph data of 100 people who had been suspects in theft crimes (Kleinmuntz & Szucko, 1984). Half the suspects were guilty and had confessed; the other half had been proven innocent. Had the polygraph experts been the judges, more than one-third of the innocent would have been declared guilty, and one-fourth of the guilty would have been declared innocent.

Before You Move On

**ASK YOURSELF**
Can you think of a recent time when you noticed your body’s reactions to an emotionally charged situation, such as a difficult social setting or perhaps even a test or game you were worrying about in advance? Did you perceive the situation as a challenge or a threat? How well did you do?

**TEST YOURSELF**
How do the two divisions of the autonomic nervous system affect our emotional responses?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

**ENGAGE**

Enrichment

The polygraph is still often widely used by government agencies. Michigan State University’s School of Criminal Justice released the results of a nationwide survey of nearly 600 police departments. A total of 63 percent expressed high confidence in using polygraph tests as evidence, 26 percent moderate confidence, 9 percent fair confidence, and only 2 percent minimal confidence.


**ENGAGE**

Applying Science

Have students watch several “cop shows” over the next week to see how those television series handle the subject of polygraphs.

- Do the events depicted seem to rely on polygraph evidence that is used to pursue, indict, or try defendants?
- Do any shows cite research on polygraphs as an argument against their use?
- Are the defendants willing to submit to polygraphs? Why or why not?
CLOSE & ASSESS
Exit Assessment
Have students differentiate among the 3 main theories of emotion: Cannon–Bard, James–Lange, and the two-factor theory. Use their explanations to help you decide how well they understand these often confused theories.

Answers to Multiple-Choice Questions
1. a
2. e

Multiple-Choice Questions
1. One night Samar became frightened when she was startled by a noise while walking down the street alone. Which theory of emotion would say that her fear resulted from the startle response alone?
   a. James-Lange
   b. Cannon-Bard
   c. Two-factor
   d. Lazarus
   e. Schachter-Singer

2. The Cannon-Bard theory of emotion states that
   a. emotional response occurs before cognition.
   b. physiological response occurs before emotional response.
   c. emotional response occurs before physiological response.
   d. cognition occurs before emotional response.
   e. physiological response and emotion occur independently and simultaneously.

Module 41 Review
41-1 How do arousal and expressive behaviors interact in emotion?

- Emotions are psychological responses of the whole organism involving an interplay among physiological arousal, expressive behaviors, and conscious experience.
- Theories of emotion generally address two major questions: (1) Does physiological arousal come before, after, or at the same time as emotional feelings, and (2) how do cognition and feeling interact?
- The James-Lange theory maintains that emotional feelings follow our body’s response to emotion-inducing stimuli.
- The Cannon-Bard theory proposes that our body responds to emotion at the same time that we experience the emotion (one does not cause the other).

41-2 To experience emotions, must we consciously interpret and label them?

- The Schachter-Singer two-factor theory holds that our emotions have two ingredients, physical arousal and a cognitive label, and the cognitive labels we put on our states of arousal are an essential ingredient of emotion.
- Lazarus agreed that many important emotions arise from our interpretations or inferences.
- Zajonc and LeDoux, however, believe that some simple emotional responses occur instantly, not only outside our conscious awareness, but before any cognitive processing occurs. This interplay between emotion and cognition illustrates our dual-track mind.

41-3 What is the link between emotional arousal and the autonomic nervous system? How does arousal affect performance?

- The arousal component of emotion is regulated by the autonomic nervous system’s sympathetic (arousing) and parasympathetic (calming) divisions.
- Performance peaks at lower levels of arousal for difficult tasks, and at higher levels for easy or well-learned tasks.

41-4 Do different emotions activate different physiological and brain-pattern responses?

- Emotions may be similarly arousing, but some subtle physiological responses, such as facial muscle movements, distinguish them.
- More meaningful differences have been found in activity in some brain pathways and cortical areas and in the hormone secretions associated with different emotions.

41-5 How effective are polygraphs in using body states to detect lies?

- Polygraphs, which measure several physiological indicators of emotion, are not accurate enough to justify widespread use in business and law enforcement. The use of guilty knowledge questions and new forms of technology may produce better indications of lying.
1. Explain the role of conscious thinking in emotion according to the theory that some emotions take the high road while others take the low road.

Answer
1 point: The high-road theory argues that conscious thinking occurs before the emotion.
1 point: The low-road theory argues that conscious awareness does not occur until after the emotional response.

2. Lynn’s boyfriend has not replied to her last three text messages. Lynn is experiencing anger, increased blood pressure, and rapid breathing. Analyze this situation using both the James-Lange and the Cannon-Bard theories of emotion.

Answer to Practice FRQ 2
1 point: The James-Lange theory argues that the blood pressure and breathing changes would lead to the emotion of anger.
1 point: The Cannon-Bard theory argues that the physical changes (blood pressure and breathing) happen at the same time as, but do not cause, the emotion of anger.

3. Which of the following is an example of cognitive appraisal?
a. Randal is happy all day because he is savoring the wonderful events of yesterday.
b. Charles is frightened in a dark alley because he remembers stories of others being attacked in dark alleys.
c. Sherika labels the arousal she is feeling as attraction because she is in the presence of a good-looking young man.
d. Dora is angry because she cannot figure out how to convince her husband to take her to Hawaii.
e. Ann is frustrated because traffic has made her late for an important meeting.

4. Which of the following characterizes the “low road” neural pathway to emotions?
a. Information travels directly from the thalamus to the amygdala.
b. The emotion results more slowly than it would via the “high road.”
c. It is an example of top-down processing.
d. It is more likely to be utilized for complex feelings.
e. It passes through the brain’s cortex.
Module 42

Expressed Emotion

Module Learning Objectives

42-1 Describe our ability to communicate nonverbally, and discuss gender differences in this capacity.

42-2 Discuss the culture-specific and culturally universal aspects of nonverbal expressions of emotion.

42-3 Describe how facial expressions influence our feelings.

Expressive behavior implies emotion. Dolphins, with smiles seemingly plastered on their faces, appear happy. To decipher people’s emotions we read their bodies, listen to their voice tones, and study their faces. Does nonverbal language vary with culture—or is it universal? And do our expressions influence our experienced emotions?

Detecting Emotion in Others

How do we communicate nonverbally? How do the genders differ in this capacity?

To Westerners, a firm handshake conveys an outgoing, expressive personality (Chaplin et al., 2000). A gaze, an averted glance, or a stare communicate intimacy, submission, or dominance (Kleinke, 1986). When two people are passionately in love, they typically spend time—quite a bit of time—gazing into each other’s eyes (Rubin, 1970). Would such gazes stir these feelings between strangers? To find out, researchers asked unacquainted male-female pairs to gaze intently for two minutes either at each other’s hands or into each other’s eyes. After separating, the eye gazers reported feeling a tingle of attraction and affection (Kellerman et al., 1989).

Most of us read nonverbal cues well. Shown 10 seconds of video from the end of a speed-dating interaction, people can often detect whether one person is attracted to another (Place et al., 2009). We are especially good at detecting nonverbal threats. In a series of subliminally flashed words, we more often sense the presence of negative ones, such as snake or bomb (Dijksterhuis & Aarts, 2003). In a crowd of faces, a single angry face “pops out” faster than a single happy one (Hansen & Hansen, 1988; Pinkham et al., 2010). And even when hearing another language, most of us readily detect anger (Schroer et al., 2003).
Experience can sensititize us to particular emotions, as shown by experiments using a series of faces (like those in **Figure 42.1** that morph from fear (or sadness) to anger. Viewing such faces, physically abused children are much quicker than other children to spot the signals of anger. Shown a face that is 60 percent fear and 40 percent anger, they are as likely to perceive anger as fear. Their perceptions become sensitively attuned to glimmers of danger that nonabused children miss.

Hard-to-control facial muscles reveal signs of emotions you may be trying to conceal. Lifting just the inner part of your eyebrows, which few people do consciously, reveals distress or worry. Eyebrows raised and pulled together signal fear. Activated muscles under the eyes and raised cheeks suggest a natural smile, called a Duchenne smile in honor of the French physician who described it. A feigned smile, such as one we make for a photographer, often is frozen in place for several seconds, then suddenly switched off. Authentic smiles tend to be briefer and to fade less abruptly (Bugental, 1986).

Our brains are rather amazing detectors of subtle expressions. Just how amazing was clear when researchers filmed teachers talking to unseen schoolchildren (Babad et al., 1991). A mere 2-second clip of either the teacher’s voice or face provided enough clues for both young and old viewers to determine whether the teacher liked and admired a child. In other experiments, even glimpsing a face for one-tenth of a second enabled people to judge people’s attractiveness or trustworthiness or to rate politicians’ competence and predict their voter support (Willis & Todorov, 2006). “First impressions . . . occur with astonishing speed,” note Christopher Olivola and Alexander Todorov (2010).

Despite our brain’s emotion-detecting skill, we find it difficult to detect deceiving expressions (Porter & ten Brinke, 2008). In one digest of 206 studies of discerning truth from lies, people were just 54 percent accurate—barely better than a coin toss (Bond & DePaulo, 2006). Moreover, contrary to claims that some experts can spot lies, the available research indicates that virtually no one—save perhaps police professionals in high-stakes situations—beats chance by much (Bond & DePaulo, 2008; O’Sullivan et al., 2009). The behavioral differences between liars and truth-tellers are too minute for most people to detect (Hartwig & Bois, 2011).

Some of us are, however, more sensitive than others to physical cues. In one study, hundreds of people were asked to name the emotion in brief film clips they watched. The clips showed portions of a person’s emotionally expressive face or body, sometimes accompanied by a garbled voice (Rosenthal et al., 1979). For example, after a 2-second scene revealing only the face of an upset woman, the researchers would ask whether the woman was criticizing someone for being late or was talking about her divorce. Given such “thin slices,” some people were much better emotion detectors than others. Introverts tend to excel at reading others’ emotions, while extraverts are generally easier to read (Ambady et al., 1995).

Gestures, facial expressions, and voice tones, which are absent in written communication, convey important information. Those who listen to 30 seconds of people describing their marital separation can better predict their current and future adjustment than can those who read a script of the recording (Mason et al., 2010). Electronic communications provide impoverished nonverbal cues. To partly remedy that, we sometimes accompany our text messages, e-mails, and online posts with emotion cues (KOVLE). The absence of expressive e-motion...
Active Learning

Does each gender seem to have “rules” for emotional expression? Ask students if the following would be acceptable in our culture:

- Two men kissing each other in greeting
- Two women patting each other on the behind during a sports competition
- Men crying at a sad movie
- Women violently expressing anger
- Men hugging to celebrate an occasion

Students may giggle at some of these proposed scenarios, but in doing so, they demonstrate that within our culture, there are “acceptable” rules for how each gender expresses emotions.

Use Student Activity: The Affect Intensity Measure from the TRM to have students assess their own emotional expressions.

Critical Questions

Have students debate whether the differences between the genders in emotional expression result from biology or the environment. Are men and women physically different from an emotional standpoint? Or does society teach women and men to express emotions differently? Have them cite evidence from the unit in their responses.

Gender, Emotion, and Nonverbal Behavior

Is women's intuition, as so many believe, superior to men's? After analyzing 125 studies of sensitivity to nonverbal cues, Judith Hall (1984, 1987) concluded that women generally do surpass men at reading people's emotional cues when given “thin slices” of behavior. Women have also surpassed men in other assessments of emotional cues, such as deciding whether a male-female couple is a genuine romantic couple or a posed phony couple, and in discerning which of two people in a photo is the other's supervisor (Barnes & Sternberg, 1989).

Women's nonverbal sensitivity helps explain their greater emotional literacy. Invited by Lisa Feldman Barrett and her colleagues (2000) to describe how they would feel in certain situations, men described simpler emotional reactions. You might like to try this yourself: Ask some people how they might feel when saying good-bye to friends after graduation. Barrett’s work suggests you are more likely to hear young men say, simply, “I’ll feel bad,” and to hear young women express more complex emotions: “It will be bittersweet; I’ll feel both happy and sad.”

Women's skill at decoding others' emotions may also contribute to their greater emotional responsiveness (Vigil, 2009). In studies of 23,000 people from 26 cultures around the world, women more than men reported themselves open to feelings (Costa et al., 2001). That helps explain the extremely strong perception that emotionality is “more true of women”—a perception expressed by nearly 100 percent of 18- to 29-year-old Americans (Newport, 2001). But the perception of women's emotionality also feeds—and is fed by—people's attributing women's emotionality to their disposition and men's to their circumstances: “She's emotional. He's having a bad day” (Barrett & Bliss-Moreau, 2009).

One exception: Anger strikes most people as a more masculine emotion. Quickly: Imagine an angry face. What gender is the person? If you're like 3 in 4 Arizona State University students, you imagined a male (Becker et al., 2007). The researchers also found that when a gender-neutral face was made to look angry, most people perceived it as male. If the face was smiling, they were more likely to perceive it as female (FIGURE 42.2).

When surveyed, women are also far more likely than men to describe themselves as empathic. If you have empathy, you identify with others and imagine what it must be like to walk in their shoes. You rejoice with those who rejoice and weep with those who weep. Children and adults who skillfully infer others’ thoughts and feelings tend to enjoy positive peer relationships (Gleason et al., 2009).
Physiological measures of empathy, such as one’s heart rate while seeing another’s distress, confirm a gender gap; though a smaller one than is indicated in survey self-reports (Eisenberg & Lennon, 1983; Rauck- ert et al., 2010). Females are also more likely to express empathy—to cry and to report distress when observing someone in distress. As FIGURE 42.3 shows, this gender difference was clear in videotapes of male and female students watching film clips that were sad (children with a dying parent), happy (slapstick comedy), or frightening (a man nearly falling off the ledge of a tall building) (Kring & Gordon, 1998). Women also tend to experience emotional events, such as viewing pictures of mutilation, more deeply, with more brain activation in areas sensitive to emotion. And they are better at remembering the scenes three weeks later (Canli et al., 2002).

Culture and Emotional Expression

How are nonverbal expressions of emotion understood within and across cultures?

The meaning of gestures varies with the culture. Former U.S. President Richard Nixon learned this while traveling in Brazil; he made the North American “A-OK” sign, not realizing it was a crude insult to Brazilians. The importance of cultural definitions of gestures and other body language was again demonstrated in 1968, when North Korea publicized photos of supposedly happy officers from a captured U.S. Navy spy ship. In the photo, three men had raised their middle fingers, telling their captors it was a crude insult to Brazilians. The importance of cultural definitions of gestures and other body language was again demonstrated in 1968, when North Korea publicized photos of supposedly happy officers from a captured U.S. Navy spy ship. In the photo, three men had raised their middle fingers, telling their captors it was a “Hawaiian good luck sign” (Fleming & Scott, 1991).

Do facial expressions also have different meanings in different cultures? To find out, two investigative teams showed photographs of various facial expressions to people in different parts of the world and asked them to guess the emotion (Ekman et al., 1975, 1987, 1994; Izard, 1977, 1994). You can try this matching task yourself by pairing the six emotions with the six faces of FIGURE 42.4.

![Figure 42.4: Culture-specific or culturally universal expressions?](image)

**Figure 42.4**


Use Student Activity: The Affect Grid from the TRM to help students see the different types of emotions people express.

TEACH

Concept Connections

Link the expression of empathy with Unit VI’s discussion of mirror neurons. Mirror neurons comprise neural systems that activate when we imagine what other people are feeling or doing. Some researchers believe that mirror neurons are the physiological mechanism of empathy.

ENGAGE

TRM | Applying Science

Have students replicate the study by Matsumoto and Ekman by showing students other pictures depicting the same emotional expressions found in Figure 42.4. Have them choose, on a scale, what emotion corresponds to each facial expression. Students will see how good people are at identifying different emotional reactions.

Use Student Activity: The Affect Grid from the TRM to help students see the different types of emotions people express.

**Figure 42.3**

Gender and expressiveness

Male and female film viewers did not differ dramatically in self-reported emotions or physiological responses. But the women’s faces showed much more emotion. (From Kring & Gordon, 1998.)

![Figure 42.3: Gender and expressiveness](image)
Emotional life is shaped by its cultural context.

Students can also interview peers from other cultures about how they express these emotions and how they might be learning to adapt their habits of emotional expression to American cultural standards.

**Diversity Connections**

Have students explore how people in different cultures express the following emotions: love and affection, fear, discomfort or displeasure, and anger.

Students can also interview peers from other cultures about how they express these emotions and how they might be learning to adapt their habits of emotional expression to American cultural standards.

**Concept Connections**

Ask students to discuss the differences in emotional expression that may occur in collectivist versus individualist cultures (Unit X). What specific types of emotions are likely to be different across these cultures? What fundamental philosophies of life might contribute to this difference in emotional expression?

**Diversity Connections**

Emotional life is shaped by its cultural context.

- The Japanese word *amae* literally means “sweet dependency”—the confident presumption of security that a happy child has in the presence of a loving mother.

- Among the Awlad Ali Bedouin of Egypt, loss and hurt are not expressed in public; instead, a person displays indifference or anger, or assigns blame. Learning that her husband of 20 years had decided to divorce her, a woman named Safiyya reported, “I never liked him.”

- Tahitians interpret sadness, longing, or loneliness as a kind of sickness. Tahitians can express *mahamehau*, eerie sensations felt in the presence of the supernatural.

Regardless of your cultural background, you probably did pretty well. A smile's a smile the world around. Ditto for anger, and to a lesser extent the other basic expressions (Elfenbein & Ambady, 1999). (There is no culture where people frown when they are happy.)

Facial expressions do convey some nonverbal accents that provide clues to one's culture (Marsh et al., 2003). Thus data from 182 studies show slightly enhanced accuracy when people judge emotions from their own culture (Elfenbein & Ambady, 2002, 2003a,b). Still, the telltale signs of emotion generally cross cultures. The world over, children cry when distressed, shake their heads when defiant, and smile when they are happy. So, too, with blind children who have never seen a face (Elfenbein & Ambady, 2001). People blind from birth spontaneously exhibit the common facial expressions associated with such emotions as joy, sadness, fear, and anger (Galati et al., 1997).

Musical expressions also cross cultures. Happy and sad music feels happy and sad around the world. Whether you live in an African village or a European city, fast-paced music seems happy, and slow-paced music seems sadder (Fritz et al., 2009).

Do these shared emotional categories reflect shared cultural experiences, such as movies and TV broadcasts seen around the world? Apparently not. Paul Ekman and his team asked isolated people in New Guinea to respond to such statements as, “Pretend your child has died.” When North American collegians viewed the taped responses, they easily read the New Guineans’ facial reactions.

So we can say that facial muscles speak a universal language. This discovery would not have surprised Charles Darwin (1809–1882) who argued that in prehistoric times, before our ancestors communicated in words, they communicated threats, greetings, and submission with facial expressions. Their shared expressions helped them survive (Hess & Thibault, 2009). A sneer, for example, retains elements of an animal baring its teeth in a snarl. Emotional expressions may enhance our survival in other ways, too. Surprise raises the eyebrows and widens the eyes, enabling us to take in more information. Disgust wrinkles the nose, closing it from foul odors.

Smiles are social as well as emotional events. Bowlers seldom smile when they score a strike; they smile when they turn to face their companions (Jones et al., 1991; Kraut & Johnston, 1979). Euphoric Olympic gold-medal winners typically don’t smile when they are awaiting their ceremony. But they wear broad grins when interacting with officials and facing the crowd and cameras (Fernández-Dols & Ruiz-Belda, 1995). Thus, a glimpse at competitors’ spontaneous expressions following an Olympic judo competition gives a very good clue to who won, no matter their country (Matsumoto et al., 2006). Even native blind athletes, who have never observed smiles, display the same social smiles in such situations (Matsumoto & Willingham, 2009).

(Although we share a universal facial language, it has been adaptive for us to interpret faces in particular contexts (Figure 42.8). People judge an angry face set in a frightening situation as afraid. They judge a fearful face set in a painful situation as pained (Carroll & Russell, 1996). Movie directors harness this phenomenon by creating contexts and soundtracks that amplify our perceptions of particular emotions.

Although cultures share a universal facial language for basic emotions, they differ in how much emotion they express. Those that encourage individuality, as in Western Europe, Australia, New Zealand, and North America, display mostly visible emotions (van Hemert et al., 2007). Those that encourage people to adjust to others, as in China, tend to have less visible displays of personal emotions (Matsumoto et al., 2009; Tsai et al., 2007). In Japan, people infer emotion more from the surrounding context. Moreover, the mouth, which is so expressive in North Americans, conveys less emotion than do the telltale eyes (Masuda et al., 2008; Naki et al., 2007).

Cultural differences also exist within nations. The Irish and their Irish-American descendants tend to be more expressive than Scandinavians and their Scandinavian-

They have many more words for anger and fear. For example, they differentiate between the fear of something happening now and the fear of an event that might occur in the future.

American descendants (Tsai & Chentsova-Dutton, 2003). And that reminds us of a familiar lesson: Like most psychological events, emotion is best understood not only as a biological and cognitive phenomenon, but also as a social-cultural phenomenon.

**The Effects of Facial Expressions**

42.3 How do our facial expressions influence our feelings?

As William James (1890) struggled with feelings of depression and grief, he came to believe that we can control emotions by “going through the outward movements” of any emotion we want to experience: “To feel cheerful,” he advised, “sit up cheerfully, look around cheerfully, and act as if cheerfulness were already there.”

Studies of the emotional effects of facial expressions reveal precisely what James might have predicted. Expressions not only communicate emotion, they also amplify and regulate it. In *The Expression of the Emotions in Man and Animals*, Charles Darwin (1872) contended that “the free expression by outward signs of an emotion intensifies it. . . . He who gives way to violent gestures will increase his rage.”

Was Darwin right? You can test his hypothesis: Fake a big grin. Now scowl. Can you feel the “smile therapy” difference? Participants in dozens of experiments have felt a difference. For example, James Laird and his colleagues (1974, 1984, 1989) subtly induced students to make a frowning expression by asking them to “contract these muscles and pull your brows together” (supposedly to help the researchers attach facial electrodes). The results? The students reported feeling a little angry. So, too, for other basic emotions. For example, people reported feeling more fear than anger, disgust, or sadness when made to construct a fearful expression: “Raise your eyebrows. And open your eyes wide. Move your whole head back, so that your chin is tucked in a little bit, and let your mouth relax and hang open a little” (Dugas et al., 1989).

**Figure 42.5**

*We read faces in context*

Whether we perceive the man in the top row as disgusted or angry depends on which body his face appears on (Aviezer et al., 2008). In the second row, tears on a face make its expression seem sadder (Provine et al., 2006).

*Whenever I feel afraid I hold my head erect And whistle a happy tune.*
-Richard Rodgers and Oscar Hammerstein, *The King and I*, 1958

**Teach**

Teaching Tip

Continue to reinforce the biopsychosocial perspective with Figure 42.5. Emotions rely heavily on the interplay of biological, psychological, and social-cultural determinants. Have students choose one particular emotion and create lists of biological, psychological, and social-cultural factors that determine the expression of that emotion.

**Engage**

Active Learning

Regardless of culture or gender, students should be able to identify correctly what emotion is being expressed. Pose the following questions to students after they complete the research exercise suggested at the bottom of page 437:

- Why is it important to study how and why emotions are expressed?
- Does the knowledge that emotional expression is universal change your attitude about people from other cultures and the opposite gender? Why or why not?

Encourage your students to recognize that emotions unify us as human beings. Since we all share these basic responses to the environment, we are really less different than we may appear.
This facial feedback effect has been repeated many times, in many places, for many basic emotions (FIGURE 42.6). Just activating one of the smiling muscles by holding a pen in the teeth (rather than with the lips, which activates a frowning muscle) is enough to make cartoons seem more amusing (Strack et al., 1988). A beaming smile—made not just with the mouth but with raised cheeks that crinkle the eyes—enhances positive feelings even more when you are reacting to something pleasant or funny (Soussignan, 2001). Smile warmly on the outside and you feel better on the inside. When smiling, you will even more quickly understand sentences that describe pleasant events (Havas et al., 2007). Scowling and the whole world seems to scowl back.

So your face is more than a billboard that displays your feelings, it also feeds your feelings. No wonder depressed patients reportedly feel better after between-the-eyebrows Botox injections that paralyzed the frowning muscles (Finzi & Wasserman, 2006). Two months after the treatment, 9 of the 10 nondrowning patients given this treatment were no longer depressed. Follow-up studies have found that Botox paralysis of the frowning muscles slows people’s reading of sadness or anger-related sentences, and it slows activity in emotion-related brain circuits (Havas et al., 2010; Hennenlotter et al., 2008). In such ways, Botox smooths life’s emotional wrinkles.

Other researchers have observed a similar behavior feedback phenomenon (Snodgrass et al., 1986). You can duplicate the participants’ experience: Walk for a few minutes with short, shuffling steps, keeping your eyes downcast. Now walk around taking long strides, with your arms swinging and your eyes looking straight ahead. Can you feel your mood shift? Going through the motions awakens the emotions.

Likewise, people perceive ambiguous behaviors differently depending on which finger they move up and down while reading a story. (This was said to be a study of the effect of using finger muscles “located near the reading muscles on the motor cortex.”) If participants read the story while moving an extended middle finger, the story behaviors seemed more hostile. If read with a thumb up, they seemed more positive. Hostile gestures prime hostile perceptions (Chandler & Schwarz, 2009; Goldin-Meadow & Brelock, 2010).

You can use your understanding of feedback effects to become more empathic: Let your own face mimic another person’s expression. Acting as another acts helps us feel what another feels (Vaughn & Lanzetta, 1981). Indeed, natural mimicry of others’ emotions helps explain why emotions are contagious (Dimberg et al., 2000; Neumann & Strack, 2000). Participants also ape one another, and such synchronized expressions help bond them (and us) together (De Waal, 2009). One social worker with Moebius syndrome, a rare facial paralysis disorder, struggled to make emotional connections with Hurricane Katrina refugees. When people made a sad expression, “I wasn’t able to return it. I tried to do so with words and tone of voice, but it was no use. Stripped of the facial expression, the emotion just dies there, unshared” (Garey, 2010).

**Figure 42.6**

How to make people smile without telling them to smile

Do as Kazuo Mori and Hikako Mori (2009) did with students in Japan: Attach rubber bands to the sides of the face with adhesive bandages, and then run them either near the head or under the chin. (1) Based on the facial feedback effect, how might students report feeling when the rubber bands pull their cheeks upward? (2) How might students report feeling when the rubber bands pull their cheeks downward?

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**ENGAGE**

**TRM** Active Learning

Have students practice facial feedback on each other. Each pair of students should write 2 sentences: one delivering good news and one delivering bad news. For example, the good news may be “You have just won the lottery!” and the bad news may be “You have just failed your math class.” Have students deliver both types of news with both happy and sad expressions. They should report their feelings as they expressed the news and as they received the news. Did the type of facial expression affect either the expression of, or reception to, the news?

Use Student Activity: Facial Feedback and the James–Lange Theory of Emotion from the TRM to help students connect facial expressions with this theory of emotion.

**ENGAGE**

**Active Learning**

Have students try the behavior feedback activity described on page 438. Does the way they carry themselves physically affect how they feel? Have students discuss whether the phrase dress for success may be a way that people have embodied this phenomenon.

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**ENGAGE**

**TRM** Active Learning

Have students try the behavior feedback activity described on page 438. Does the way they carry themselves physically affect how they feel? Have students discuss whether the phrase dress for success may be a way that people have embodied this phenomenon.
How do our emotions, personality, attitudes, and behaviors influence our risk of disease? What can we do to prevent illness and promote health? To study how stress and healthy and unhealthy behaviors influence health and illness, psychologists and physicians created the interdisciplinary field of behavioral medicine, integrating behavioral and medical knowledge. 

Health psychology provides psychology’s contribution to behavioral medicine. Let’s consider some of psychology’s findings on stress and ways of coping with it.

**Before You Move On**

**ASK YOURSELF**
Can you think of one situation in which you would like to change the way you feel, and create a simple plan for doing so? For instance, if you would like to feel more cheerful on your way to class tomorrow morning rather than dragging yourself there, you might try walking briskly—with head held high and a pleasant expression on your face.

**TEST YOURSELF**
Who tends to express more emotion—men or women? How do we know the answer to that question?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

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* * *

**Module 42 Review**

42-1 **How do we communicate nonverbally? How do the genders differ in this capacity?**

- Much of our communication is through body movements, facial expressions, and voice tones. Even seconds-long filmed slices of behavior can reveal feelings.
- Women tend to read emotional cues more easily and to be more empathic.

42-2 **How are nonverbal expressions of emotion understood within and across cultures?**

- The meaning of gestures varies with culture, but facial expressions, such as those of happiness and fear, are common the world over.
- Cultures also differ in the amount of emotion they express.

42-3 **How do our facial expressions influence our feelings?**

- Research on the facial feedback effect shows that our facial expressions can trigger emotional feelings and signal our body to respond accordingly.
- We also mimic others’ expressions, which helps us empathize.

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**CLOSE & ASSESS**

**Exit Assessment**

Have students create their own list of “basic” emotions. Have them record as many different emotions as they can, narrowing down the list into categories. Have students compare their lists of basic emotions with one another and the book. Most likely, students will recognize general agreement among their lists.
Answers to Multiple-Choice Questions

1. d  
2. e

Answer to Practice FRQ 2

1 point: When surveyed, women describe themselves as more empathic.

1 point: Heart rates of women increase more than those of men when both are watching a scene of someone in distress.

1 point: Women are more likely to express empathy when observing someone in distress.

1 point: Women experience emotional events more deeply.

Multiple-Choice Questions

1. What do we call the tendency of facial muscle states to trigger corresponding feelings such as fear, anger, or happiness?
   a. Culture-specific expression
   b. Moebius syndrome
   c. Botox
   d. Facial feedback effect
   e. Culturally universal expression

2. Which of the following statements is most accurate regarding emotion?
   a. Smiles are neither social nor emotional events.
   b. Inhabitants of individualist countries are more likely to display nonverbal emotions than inhabitants of collectivist countries.
   c. Mouths convey more emotion than eyes.
   d. Natively blind people who have never seen a smile will never generate a smile.
   e. Cultures share a universal facial language for basic emotions.

3. Which subfield of psychology provides psychology’s contribution to behavioral medicine?
   a. Cognitive
   b. Health
   c. Clinical
   d. Educational
   e. Community

Practice FRQs

1. Name the phenomenon describing the impact facial expressions can have on our disposition, and give an example.
   
   Answer
   1 point: The facial feedback effect.
   1 point: For example, smiling makes you feel happy and frowning makes you feel a little angry.

2. Name four pieces of evidence that suggest women are more empathic than men.
   (4 points)
Discussion Starter

Use the Module 43 Fact or Falsehood? activity from the TRM to introduce the concepts from this module.

Enrichment

Studies of stressors have shown that people’s number one fear is speaking in public. Second to this fear is the fear of dying. Citing this finding, comedian Jerry Seinfeld has joked that people are more afraid of giving the eulogy at a funeral than being in the casket!

Module Learning Objective

Identify events that provoke stress responses, and describe how we respond and adapt to stress.

How often do you experience stress in your daily life? Never? Rarely? Sometimes? Or frequently? When pollsters put a similar question to college students, some 85 percent recalled experiencing stress during the last three months—and most said it had disrupted their schoolwork at least once (AP, 2009). On entering college or university, 18 percent of men and 41 percent of women reported having been “frequently overwhelmed” by all they had to do during the past year (Pryor et al., 2012).

For many students, the high school years, with their new relationships and more demanding challenges, prove stressful. Deadlines become relentless and intense at the end of each term. The time demands of volunteering, sports, music and theater, work, college prep courses, and college applications combine with occasional family tensions and success pressures. Sometimes it’s enough to give you a headache or disrupt sleep.

Stress often strikes without warning. Imagine being 21-year-old Ben Carpenter on the world’s wildest and fastest wheelchair ride. As he crossed an intersection on a sunny summer afternoon in 2007, the light changed. A large truck, whose driver didn’t see him, started moving into the intersection. As they bumped, Ben’s wheelchair turned to face forward, and its handles got stuck in the truck’s grille. Off they went, the driver unable to hear Ben’s cries for help. As they sped down the highway about an hour from my home, passing motorists caught the bizarre sight of a truck pushing a wheelchair at 50 miles per hour and started calling 911. (The first caller: “You are not going to believe this. There is a semi truck pushing a guy in a wheelchair on Red Arrow highway!”) Lucky for Ben, one passerby was an undercover police officer. Pulling a quick U-turn, he followed the truck to its destination a couple of miles from where the wild ride had started, and informed the disbeliefing driver that he had a passenger hooked in his grille. “It was very scary,” said Ben, who has muscular dystrophy. In this section, we explore stress—what it is and how it affects us.
**ENGAGE**

*Active Learning*

Have students brainstorm about different stressors they encounter on a regular school day. Assign each of several small groups a different stressor, challenging them to come up with at least 3 positive ways to handle the stress. Have students try to think of coping methods that are realistic for people their age. Then they should share their ideas with the group at large, discussing why teens don’t always handle stress very well.

**ENGAGE**

*Enrichment*

There are 2 types of stress:

- **Distress** is stress perceived as negative—those events we typically think of when we think of “stress.”
- **Eustress** is stress perceived as positive, but this kind of stress still involves heightened arousal.

Both types of stress, endured over a prolonged period of time, can lead to harmful physical effects, even though eustress is more pleasant to endure.

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**Stress: Some Basic Concepts**

43-1 What events provoke stress responses, and how do we respond and adapt to stress?

Stress is a slippery concept. We sometimes use the word informally to describe threats or challenges (“Ben was under a lot of stress”), and at other times our responses (“Ben experienced acute stress”). To a psychologist, the dangerous truck ride was a stressor. Ben’s physical and emotional responses were a stress reaction. And the process by which he related to the threat was stress. Thus, stress is the process of appraising and responding to a threatening or challenging event (FIGURE 43.1). Stress arises less from events themselves than from how we appraise them (Lazarus, 1998). One person, alone in a house, ignores its creaking sounds and experiences no stress; someone else suspects an intruder and becomes alarmed. One person regards a new job as a welcome challenge; someone else appraises it as risky failure.

When short-lived, or when perceived as challenges, stressors can have positive effects. A momentary stress can mobilize the immune system for fending off infections and healing wounds (Segerstrom, 2007). Stress also arouses and motivates us to conquer problems. In a Gallup World Poll, those who were stressed but not depressed reported being energized and satisfied with their lives—the opposite of the lethargy of those depressed but not stressed (Ng et al., 2009). Championship athletes, successful entertainers, and great teachers and leaders all thrive and excel when aroused by a challenge (Blascovich et al., 2004). Having conquered cancer or rebounded from a lost job, some people emerge with stronger self-esteem and a deepened spirituality and sense of purpose. Indeed, some stress early in life is conducive to later emotional resilience (Landauer & Whiting, 1979). Adversity can beget growth.

Extreme or prolonged stress can harm us. Children who suffer severe or prolonged abuse are later at risk of chronic disease (Repetti et al., 2002). Troops who had posttraumatic stress reactions to heavy combat in the Vietnam war later suffered greatly elevated rates of circulatory, digestive, respiratory, and infectious diseases (Boscarino, 1997). People who lose their jobs, especially later in their working life, are at increased risk of heart problems and death (Gallo et al., 2006; Sullivan & von Wachter, 2009).

So there is an interplay between our heads and our health. Before exploring that interplay, let’s look more closely at stressors and stress reactions.

**Stressors—Things That Push Our Buttons**

Stressors fall into three main types: catastrophes, significant life changes, and daily hassles. All can be toxic.

---

**Figure 43.1**

**Stress appraisal**

The events of our lives flow through a psychological filter. How we appraise an event influences how much stress we experience and how effectively we respond.

- **Stressful event**
- **Extreme heat**
- **Tough math test**
- **Tell me what this is beyond me!**
- **I’ve got to apply all I know.**
- **I’m stressed to distraction.**
- **I’m aroused, focused.**
CATASTROPHES

Catastrophes are unpredictable large-scale events, such as wars, earthquakes, floods, wildfires, and famines. Nearly everyone appraises catastrophes as threatening. We often give aid and comfort to one another after such events, but damage to emotional and physical health can be significant. In surveys taken in the three weeks after the 9/11 terrorist attacks, for example, two-thirds of Americans said they were having some trouble concentrating and sleeping (Wahlgren, 2001). In the New York area, people were especially likely to report such symptoms, and sleeping pill prescriptions rose by a reported 28 percent (HMEH, 2002a, NSF, 2001). In the four months after Hurricane Katrina, New Orleans’ suicide rate reportedly tripled (Sauly, 2006).

For those who respond to catastrophes by relocating to another country, the stress is twofold. The trauma of uprooting and family separation combine with the challenges of adjusting to the new culture’s language, ethnicity, climate, and social norms (Pipher, 2002, Williams & Berry, 1991). In the first half-year, before their morale begins to rebound, newcomers often experience culture shock and deteriorating well-being (Markovitz & Samul, 2008). Such relocations may become increasingly common because of climate change in years to come.

SIGNIFICANT LIFE CHANGES

Life transitions are often keenly felt. Even happy events, such as getting married, can be stressful. Other changes—graduating from high school, leaving home for college, losing a job, having a loved one die—often happen during young adulthood. The stress of those years was clear in a survey in which 15,000 Canadian adults were asked whether “You are trying to take on too many things at once.” Responses indicated highest stress levels among young adults (Statistics Canada, 1999). Young adult stress appeared again when 650,000 Americans were asked if they had experienced a lot of stress “yesterday” (Figure 43.2).

Some psychologists study the health effects of life changes by following people over time. Others compare the life changes recalled by those who have or have not suffered a specific health problem, such as a heart attack. These studies indicate that people recently widowed, fired, or divorced are more vulnerable to disease (Dohrenwend et al., 1982; Strulynch, 2009). In one Finnish study of 96,000 widowed people, their risk of death doubled in the week following their partner’s death (Kaprio et al., 1987). Experiencing a cluster of crises—losing a job, home, and partner, for example—puts one even more at risk.

Using available resources, including the Internet, have students work independently or with partners to research stress in other countries by considering the following questions:

- What types of daily stressors are common in that country?
- What cultural expectation exists about handling stress?
- How has that particular country dealt with a major catastrophic event in its history?
- What are the instances of depression and suicide among people of that country/culture? What do these statistics say about how the individuals in this country/culture respond to stress?

If they give permission, international students could be interviewed for personal opinions and information about how their cultures deal with stress.

Active Learning

Have students research some significant catastrophes (wars, natural disasters, and so forth) that have occurred throughout history. Ask them to analyze how well the people and nations affected by these catastrophes dealt with stress before, during, and after the event:

- Were general conditions particularly stable before the catastrophe? Why or why not?
- Why did the catastrophe take place? Was someone or something to blame, or was the event completely unpredictable and uncontrollable? Why? How did this affect the collective psyche?
- What was the immediate impact of the catastrophe on the people or nation?
- How long did the effects of the catastrophe last?
- Did the people or nation emerge stronger from the catastrophe? Why or why not?
DAILY HASSLES
Events don’t have to remake our lives to cause stress. Stress also comes from daily hassles—rush-hour traffic, aggravating siblings, long lunch lines, too many things to do, family frustrations, and friends who don’t respond to calls or texts (Kohn & Macdonald, 1992; Repetti et al., 2009; Ruffin, 1993). Some people can simply shrug off such hassles. For others, however, the everyday annoyances add up and make even a small task feel like a large one.

Many people face more significant daily hassles. As the Great Recession of 2008–2009 bottomed out, Americans’ most oft-cited stressors related to money (76 percent), work (70 percent), and the economy (65 percent) (APA, 2010). Such stressors are well-known to residents of impoverished areas, where many people routinely face inadequate income, unemployment, solo parenting, and overcrowding. Prolonged stress takes a toll on our cardiovascular system. Daily pressures may be compounded by anti-gay prejudice or racism, which—like other stressors—can have both psychological and physical consequences (Pascoe & Richman, 2009; Rostosky et al., 2010; Swin et al., 2009). Thinking that some of the people you encounter each day will dislike you, distrust you, or doubt your abilities makes daily life stressful. Such stress takes a toll on the health of many African-Americans, driving up blood pressure levels (Ong et al., 2009; Mays et al., 2007).

The Stress Response System
Medical interest in stress dates back to Hippocrates (460–377 B.C.E.). In the 1920s, Walter Cannon (1929) confirmed that the stress response is part of a unified mind-body system. He observed that extreme cold, lack of oxygen, and emotion-arousing events all trigger an outpouring of the stress hormones epinephrine and norepinephrine from the core of the adrenal glands. When alerted by any of a number of brain pathways, the sympathetic nervous system (see Figure 43.4) increases heart rate and respiration, diverts blood from digestion to the skeletal muscles, dulls feelings of pain, and releases sugar and fat from the body’s stores. All this prepares the body for the wonderfully adaptive response that Cannon called fight or flight.

Since Cannon’s time, physiologists have identified an additional stress response system. On orders from the cerebral cortex (via the hypothalamus and pituitary gland), the outer part of the adrenal glands secretes glucocorticoids stress hormones such as cortisol. The two systems work at different speeds, explains biologist Robert Sapolsky (2003): “In a fight-or-flight scenario, epinephrine is the one handing out guns; glucocorticoids are the ones drawing up blueprints for new aircraft carriers needed for the war effort.” The epinephrine guns were firing at high speed during an experiment inadvertently conducted on a British Airways San Francisco to London flight. Three hours after takeoff, a mistakenly played message told passengers the plane was about to crash into the sea. Although the flight crew immediately recognized the error and tried to calm the terrified passengers, several required medical assistance (Associated Press, 1999).

Canadian scientist Hans Selye’s (1936, 1976) 40 years of research on stress extended Cannon’s findings. His studies of animals’ reactions to various stressors, such as electric shock and surgery, helped make stress a major concept in both psychology and medicine. Selye proposed that the body’s adaptive response to stress is so general that, like a single burglar alarm, it sounds, no matter what it intrudes. He named this response the general adaptation syndrome (GAS), and he saw it as a three-phase process (FIGURE 43.3).

In a Phase 1, you perceive the situation and respond. In Phase 2, you use energy reserves. In Phase 3, you replenish yourself. The epinephrine guns were firing at high speed during an experiment inadvertently conducted on a British Airways San Francisco to London flight. Three hours after takeoff, a mistakenly played message told passengers the plane was about to crash into the sea. Although the flight crew immediately recognized the error and tried to calm the terrified passengers, several required medical assistance (Associated Press, 1999).

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pump hormones into your bloodstream. You are fully engaged, summoning all your resources to meet the challenge.

As time passes, with no relief from stress, your body's reserves begin to run out. You have reached Phase 3, exhaustion. With exhaustion, you become more vulnerable to illness or even, in extreme cases, collapse and death.

Selye's basic point: Although the human body copes well with temporary stress, prolonged stress can damage it. The brain's production of new neurons slows and some neural circuits degenerate (Dias-Ferreira et al., 2009; Mirescu & Gould, 2006). One study found shortening of telomeres, pieces of DNA at the ends of chromosomes, in women who suffered enduring stress as caregivers for children with serious disorders (Epel et al., 2004). Telomere shortening is a normal part of the aging process; when telomeres get too short, the cell can no longer divide and it ultimately dies. The most stressed women had cells that looked a decade older than their chronologically age, which may help explain why severe stress seems to age people. Even fearful, easily stressed rats have been found to die sooner (after about 600 days) than their more confident siblings, which average 700-day life spans (Cavigelli & McClintock, 2003).

Fortunately, there are other options for dealing with stress. One is a common response to a loved one's death: Withdraw. Pull back. Conserve energy. Faced with an extreme disaster, such as a ship sinking, some people become paralyzed by fear. Another stress response, found especially among women, is to seek and give support (Taylor et al., 2000, 2006). This tend-and-befriend response is demonstrated in the outpouring of help after natural disasters.

Facing stress, men more often than women tend to socially withdraw, turn to alcohol, or become aggressive. Women more often respond to stress by nurturing and banding together. This may in part be due to oxytocin, a stress-moderating hormone associated with pair bonding in animals and released by cuddling, massage, and breast feeding in humans.
(Campbell, 2010; Taylor, 2006). Gender differences in stress responses are reflected in brain scars: Women’s brains become more active in areas important for face processing and empathy, men’s become less active (Mather et al., 2010).

It often pays to spend our resources in fighting or fleeing an external threat. But we do so at a cost. When stress is momentary, the cost is small. When stress persists, we may pay a much higher price, with lowered resistance to infections and other threats to mental and physical well-being.

**Before You Move On**

**ASK YOURSELF**

How often is your stress response system activated? What are some of the things that have triggered a fight-or-flight response for you?

**TEST YOURSELF**

What two processes happen simultaneously when our stress response system is activated? What happens if the stress is continuous?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

**Module 43 Review**

43-1 What events provoke stress responses, and how do we respond and adapt to stress?

- Stress is the process by which we appraise and respond to stressors (catastrophic events, significant life changes, and daily hassles) that challenge or threaten us.
- Walter Cannon viewed the stress response as a “fight-or-flight” system.
- Later researchers identified an additional stress-response system in which the adrenal glands secrete glucocorticoid stress hormones.
- Hans Selye proposed a general three-phase (alarm-resistance-exhaustion) general adaptation syndrome (GAS).
- Prolonged stress can damage neurons, hastening cell death.
- Facing stress, women may have a tend-and-befriend response; men may withdraw socially, turn to alcohol, or become aggressive.

**Multiple-Choice Questions**

1. Which of the following is an example of stress?
   a. Ray is tense and anxious as he has to decide which college to attend.
   b. Sunga is assigned an extra shift at work.
   c. Joe’s parents are allowing him to stay home alone while they go away for a weekend.
   d. Linda remembers to repay a friend the $10 she owes her.
   e. Enrico learns of a traffic accident on the Interstate.

2. The general adaptation syndrome (GAS) begins with
   a. resistance.
   b. appraisal.
   c. exhaustion.
   d. alarm.
   e. challenge.

3. Which of the following is likely to result from the release of oxytocin?
   a. A fight-or-flight response
   b. A tend-and-befriend response
   c. Elevated hunger
   d. Exhaustion
   e. Social isolation

**Answers to Multiple-Choice Questions**

1. a 3. b 2. d
Answer to Practice FRQ 2

1. The alarm phase occurs when you mobilize your resources to cope with the stressor.

2. The resistance phase occurs when you actively attempt to cope with the stressor.

3. The exhaustion phase occurs when your reserves for coping become depleted.

Practice FRQs

1. Xavier has a huge math test coming up next Tuesday. Explain two ways appraisal can determine how stress will influence his test performance.

   Answer
   1 point: If Xavier interprets the test as a challenge he will be aroused and focused in a way that could improve his test performance.
   1 point: If Xavier interprets the test as a threat he will be distracted by stress in a way that is likely to harm his test performance.

2. Name and briefly describe the three phases of Hans Selye's general adaptation syndrome (GAS).

   (3 points)
Module 44
Stress and Illness

Module Learning Objectives

44-1 Describe how stress makes us more vulnerable to disease.
44-2 Explain why some of us are more prone than others to coronary heart disease.

44-1 How does stress make us more vulnerable to disease?

Not so long ago, the term psychosomatic described psychologically caused physical symptoms. In common usage, the term came to mean that the symptoms were unreal—"merely" psychosomatic. To avoid such connotations and to better describe the genuine physiological effects of psychological states, most experts today refer instead to stress-related psychophysiological illnesses, such as hypertension and some headaches. Stress also leaves us less able to fight off disease. The field of psychoneuroimmunology studies these mind-body interactions (Kiecolt-Glaser, 2009). This awkward name makes sense when said slowly: Your thoughts and feelings (psycho) influence your brain (neuro), which influences the endocrine hormones that affect your disease-fighting immune system. And this field is the study of (alleged) those interactions.

Hundreds of experiments reveal the nervous and endocrine systems' influence on the immune system (Sternberg, 2009). You can think of the immune system as a complex surveillance system. When it functions properly, it keeps you healthy by isolating and destroying bacteria, viruses, and other invaders. Four types of cells are active in these search-and-destroy missions (FIGURE 44.1). Two are types of white blood cells, called lymphocytes. B lymphocytes mature in the bone marrow and release antibodies that fight bacterial infections. T lymphocytes form in the thymus and other lymphatic tissue and attack cancer cells, viruses, and foreign substances—often "good" ones, such as transplanted organs. The third agent is the macrophage ("big eater"), which identifies, pursues, and ingests harmful invaders and worn-out cells. And, finally, the natural killer cells (NK cells) pursue diseased cells (such as those infected by viruses or cancer). Your age, nutrition, genetics, body temperature, and stress all influence your immune system's activity.

When your immune system doesn't function properly, it can err in two directions. Responding too strongly, it may attack the body's own tissues, causing some forms of arthritis or an allergic reaction. Underreacting, it may allow a dormant herpes virus to erupt or cancer cells to multiply. Women are immunologically stronger than men, making them less susceptible to infections, but this very strength also makes them more susceptible to self-attacking diseases, such as lupus and multiple sclerosis (Morell, 1995; Pido-Lopez et al., 2001).

Your immune system is not a headless horseman. The brain regulates the secretion of stress hormones, which suppresses the disease-fighting lymphocytes. Immune suppression appears when animals are stressed by physical restraints, unavoidable electric shocks, noise, crowding, cold water, social defeat, or separation from their mothers (Maier et al., 1994).

One six-month study monitored immune responses in 43 monkeys (Cohen et al., 1992).
Stress and Illness

Critical Questions

Illness tends to occur during times of stress. For students, stressful times usually coincide at exam time. Have students consider the following questions:

- Do you feel most stressed around exam time at your school? Why or why not?
- How could you personally reduce your stress level at exam time?
- How do your teachers and administrators try to reduce the stress of this period?
- What other actions could be taken to make exam time less stressful?

Twenty-one were stressed by being housed with new roommates—three or four new monkeys—each month. By the end of the experiment, the socially disrupted monkeys' immune systems were weaker than those of monkeys left in stable groups. Human immune systems react similarly. Two examples:

1. Surgical wounds heal more slowly in stressed people. In one experiment, dental students received punch wounds (precise small holes punched in the skin). Compared with wounds placed during summer vacation, those placed three days before a major exam healed 40 percent more slowly (Kiecolt-Glaser et al., 1998). Marriage conflict also slows punch-wound healing (Kiecolt-Glaser et al., 2005).

2. Stressed people are more vulnerable to colds. Researchers dropped a cold virus into the noses of stressed and relatively unstressed people (Figure 44.2). Among those living stress-filled lives, 47 percent developed colds. Among those living relatively free of stress, only 27 percent did. In follow-up research, the happiest and most relaxed people were likewise markedly less vulnerable to an experimentally delivered cold virus (Cohen et al., 2003, 2006). Other studies reveal that major life stress increases the risk of a respiratory infection (Pedersen et al., 2010).

Figure 44.1

A simplified view of immune responses

Intruder

- Is it a bacterial infection?
- Is it a cancer cell, virus, or other "foreign substance"?
- Is it some other harmful intruder, or perhaps a worn-out cell needing to be cleaned up?

Response: Send in natural killer cells (NK cells) such as the two shown here attacking a cell infected by cancer.

Response: Send in B lymphocytes, such as this one in front of a macrophage.

Response: Send in T lymphocytes, such as this one.

Response: Send in macrophages, such as the large one shown here, which is about to trap and destroy a tiny bacterium (lower right).

Figure 44.2

Stress and colds

In an experiment by Sheldon Cohen and colleagues (1991), people with the highest life stress scores were also most vulnerable when exposed to an experimentally delivered cold virus.
Common Pitfalls
Help students appreciate the difference between being HIV-positive and having AIDS. Being HIV-positive means that one is infected with the virus that causes AIDS. Having AIDS means that one has symptoms of diseases that result from a deficient immune system.

The stress effect on immunity makes physiological sense. It takes energy to track down invaders, produce swelling, and maintain fevers. Thus, when diseased, your body reduces muscular energy output by inactivity and increased sleep. Stress does the opposite. It creates a competing energy need. During an aroused fight-or-flight reaction, your stress responses divert energy from your disease-fighting immune system and send it to your muscles and brain (see Figure 41.4). This renders you more vulnerable to illness. The bottom line: Stress does not make us sick, but it does alter our immune functioning, which leaves us less able to resist infection.

Let’s consider some ways that stress might affect AIDS, cancer, and heart disease.

Stress and Susceptibility to Disease

Stress and AIDS
We know that stress suppresses immune functioning. What does this mean for people with AIDS (acquired immune deficiency syndrome)? As its name tells us, AIDS is an immune disorder, caused by the human immunodeficiency virus (HIV). AIDS has become the world’s fourth leading cause of death and Africa’s number one killer.

Ironically, if a disease is spread by human contact (as AIDS is, through the exchange of bodily fluids, primarily semen and blood), and if it kills slowly (as AIDS does), it can be lethal to more people. Those who acquire HIV often spread it in the highly contagious first few weeks before they know they are infected. Worldwide, some 2.6 million people—slightly more than half of them women—became infected with HIV in 2009, often without their awareness (UNAIDS, 2010). Years after the initial infection, when AIDS appears, people have difficulty fighting off other diseases, such as pneumonia. More than 25 million people worldwide have died of AIDS (UNAIDS, 2010). In the United States, where “only” a half-million of these fatalities have occurred, AIDS has killed more people than did combat in all the twentieth-century wars.

Stress cannot give people AIDS. But could stress and negative emotions speed the transition from HIV infection to AIDS in someone already infected? Might stress predict a faster decline in those with AIDS? The answer to both questions seems to be yes (Bower et al., 1998; Kiecolt-Glaser & Glaser, 1995; Leserman et al., 1999). HIV-infected men who experience stressful events, such as the loss of a partner, exhibit somewhat greater immune suppression and travel a faster course in this disease.

Would efforts to reduce stress help control the disease? Again, the answer appears to be yes. Educational initiatives, bereavement support groups, cognitive therapy, relaxation training, and exercise programs that reduce stress have all had positive consequences for HIV-positive people (Baum & Polusny, 1999; McCain et al., 2008; Schneiderman, 1999). But the benefits are small, compared with available drug treatments.

Although AIDS is now more treatable than ever before, preventing HIV infection is a far better option. This is the focus of many educational programs, such as the ABC (abstinence, being faithful, using condoms) program that has been used with seeming success in Uganda (Altmann, 2004; USAID, 2004). In addition to such programs that seek to influence sexual norms and behaviors, today’s “combination prevention” programs also include medical strategies (such as drugs and male circumcision that reduce HIV transmission) and efforts to reduce social inequalities that increase HIV risk (UNAIDS, 2010).
Stress and Cancer

Stress does not create cancer cells. But in a healthy, functioning immune system, lymphocytes, macrophages, and NK cells search out and destroy cancer cells and cancer-damaged cells. If stress weakens the immune system, might this weaken a person’s ability to fight off cancer? To explore a possible connection between stress and cancer, experimenters have implanted tumor cells in rodents or given them carcinogens (cancer-producing substances). They then exposed some rodents to uncontrollable stress, such as inescapable shocks, which weakened their immune systems. Those rodents were indeed more prone to developing cancer (Sklar & Anisman, 1981). Their tumors developed sooner and grew larger than in nonstressed rodents.

Does this stress-cancer link also hold with humans? The results are mixed. Some studies find that people are at increased risk for cancer within a year after experiencing depression, helplessness, or bereavement (Chida et al., 2008; Szeptoe et al., 2010). In one large Swedish study, the risk of colon cancer was 5.5 times greater among people with a history of workplace stress than among those who reported no such problems. This difference was not attributable to group differences in age, smoking, drinking, or physical characteristics (Courney et al., 1993). Other studies, however, have found no link between stress and human cancer (Coyne et al., 2010, Petticrew et al., 1999, 2002). Concentration camp survivors and former prisoners of war, for example, do not have elevated cancer rates.

One danger in hyping reports on emotions and cancer is that some patients may then blame themselves for their illness: “If only I had been more expressive, relaxed, and hopeful.” A corollary danger is a “wellness macho” among the healthy, who take credit for their “healthy character” and lay a guilt trip on the ill: “She has cancer! That’s what you get for holding your feelings in and being so nice.” Dying thus becomes the ultimate failure.

It’s important enough to repeat: Stress does not create cancer cells. At worst, it may affect their growth by weakening the body’s natural defenses against multiplying malignant cells (Kossler et al., 1991). Although a relaxed, hopeful state may enhance these defenses, we should be aware of the thin line that divides science from wishful thinking. The powerful biological processes at work in advanced cancer or AIDS are not likely to be completely derailed by avoiding stress or maintaining a relaxed and determined spirit (Anderson, 2002; Kossler et al., 1991). And that explains why research consistently indicates that psychotherapy does not extend cancer patients’ survival (Coyne et al., 2007, 2009; Coyne & Fennem, 2010).

Stress and Heart Disease

Why are some of us more prone than others to coronary heart disease?

Stress is much more closely linked to coronary heart disease, North America’s leading cause of death. In this disease, the blood vessels that nourish the heart muscle gradually close. Hypertension and a family history of the disease increase the risk of coronary heart disease. So do many behavioral factors (smoking, obesity, a high-fat diet, physical inactivity), physiological factors (an elevated cholesterol level), and psychobiological factors (stress responses and personality traits).

In some classic studies, Meyer Friedman, Ray Rosenman, and their colleagues tested the idea that stress increases vulnerability to heart disease by measuring the blood cholesterol level and clotting speed of 40 U.S. male tax accountants at different times of year (Friedman & Rosenman, 1974; Friedman & Ulmer, 1984). From January through March, the test results were completely normal. Then, as the accountants began scrambling to finish their clients’ tax returns before the April 15 filing deadline, their cholesterol and clotting measures rose to dangerous levels. In May and June, with the deadline past, the measures returned to normal. Stress predicted heart attack risk for these men. The researchers’ hunch had paid off, launching a classic nine-year study of more than 3000 healthy men, aged 35 to 59.

Active Learning

Contact local oncologists to see what their opinion is on a stress–cancer link.

- Have they observed a link between cancer and stress in their own practice? Why or why not?
- How do they suggest their patients deal with stress?
- What support groups are available in your area for cancer patients?

Common Pitfalls

Point out to students that a high-energy and stressful life is not the main contributor to coronary heart disease. If Type A personalities deal with stress by reacting negatively— with hostility and combativeness—they will be more likely to experience coronary heart disease.
At the start of the study, the researchers interviewed each man for 15 minutes, noting his work and eating habits, manner of talking, and other behavioral patterns. Those who seemed the most reactive, competitive, hard-driving, impatient, time-conscious, supermotivated, verbally aggressive, and easily angered they called Type A. The roughly equal number who were more easygoing they called Type B. Which group do you suppose turned out to be the most coronary-prone?

Nine years later, 257 men had suffered heart attacks, and 69 percent of them were Type A. Moreover, not one of the “pure” Type Bs—the most mellow and laid back of their group—had suffered a heart attack.

As often happens in science, this exciting discovery provoked enormous public interest. But after that initial honeymoon period, researchers wanted to know more. Was the finding reliable? If so, what is the toxic component of the Type A profile: Time-consciousness? Competitiveness? Anger?

More than 700 studies have now explored possible psychological correlates or predictors of cardiovascular health (Chida & Hamer, 2008; Chida & Steptoe, 2009). These reveal that Type A’s toxic core is negative emotions—especially the anger associated with an aggressively reactive temperament. As we will see in Module 83’s discussion of anger, when we are harassed or challenged, our active sympathetic nervous system redistributes bloodflow to our muscles, pulling it away from our internal organs. One of those organs, the liver, which normally removes cholesterol and fat from the blood, can’t do its job. Type A individuals are more often “combat ready.” Thus, excess cholesterol and fat may continue to circulate in their blood and later get deposited around the heart. Further stress—sometimes conflicts brought on by their own abrasiveness—may trigger altered heart rhythms. In people with weakened hearts, this altered pattern can cause sudden death (Kamarck & Jennings, 1991). Hostility also correlates with other risk factors, such as smoking, drinking, and obesity (Bunde & Suls, 2006). In important ways, people’s minds and hearts interact.

Hundreds of other studies of young and middle-aged men and women have confirmed the finding that people who react with anger over little things are the most coronary-prone. Suppressing negative emotions only heightens the risk (Kupper & Derridje, 2007). One study followed 13,000 middle-aged people for 5 years. Among those with normal blood pressure, people who had scored high on anger were three times more likely to have had heart attacks, even after researchers controlled for smoking and weight (Williams et al., 2000). Another study followed 1305 male medical students over an average of 36 years. Those who had reported being hot tempered were five times more likely to have had a heart attack by age 55 (Chang et al., 2002). As others have noted, rage “seems to lash back and strike us in the heart muscle” (Spiegelberg & London, 1982).

Pessimism seems to be similarly toxic. One study followed 1306 initially healthy men who a decade earlier had scored as optimists, pessimists, or neither. Even after other risk factors such as smoking had been ruled out, pessimists were more than twice as likely as optimists to develop heart disease (Figure 44.3) (Kubzansky et al., 2001).

Figure 44.3

Pessimism and heart disease

Of Harvard School of Public Health team found pessimistic men at doubled risk of developing heart disease over a 10-year period. (From Kubzansky et al., 2001)

<table>
<thead>
<tr>
<th>Pessimism</th>
<th>Optimists</th>
<th>Percentage developing coronary heart disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Optimists</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Pessimists</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

**FYI**

In both India and America, Type A bus drivers are literally hard-driving. They brake, pass, and honk their horns more often than their more-easygoing Type B colleagues (Evans et al., 1987).

“The fire you kindle for your anxiety often burns you more than him.” —Oriental proverb

Type A: Friedman and Rosenman’s term for competitive, hard-driving, impatient, verbally aggressive, and anger-prone people.

Type B: Friedman and Rosenman’s term for easygoing, relaxed people.

**TEACH**

**TRM Enrichment**

Redford Williams’ *The Trusting Heart: Great News About Type A Behavior* discusses overcoming the hostile and cynical elements of Type A behavior. After showing how hostility and cynical mistrust seem to be the lethal aspects of Type A syndrome, Williams suggests that the route to a more trusting heart requires 3 changes:

- First, Type A’s must reduce their cynical mistrust of others.
- Second, they must reduce the frequency and intensity with which they experience anger, frustration, irritation, and rage.
- Third, they must learn to treat others with kindness and consideration and to develop their assertiveness skills for unavoidable situations.

Use Student Activity: Type A and Type B Personalities from the TRM to help students identify their own personality types.

**ENGAGE**

**Flip It**

Students can get additional help understanding Type A and Type B personalities by watching the Flip It Video: Type A and Type B.

**TEACH**

**TRM Teaching Tip**

Divide students into groups, and have them list the 3 most stressful circumstances that teens deal with on a daily basis. Then have them list some explanations for why these events happen and why they are stressful. As students present their reasons to the class, they should analyze if the attributions are optimistic or pessimistic. Help students see that optimistic thinking empowers people to seek ways to change stressful situations, whereas pessimistic thinking does not provide a way out of a stressful circumstance.

Use Student Activity: Hostility and Its Alleviation from the TRM so students can see the impact of hostility on health.
Depression, too, can be lethal. Happy people tend to be healthier and to outlive their unhappy peers (Dermer & Chan, 2011; Shahpash et al., 2008). Even a big, happy smile predicts longevity, as Ernest Abel and Michael Kruger (2010) discovered when they examined the photographs of 150 Major League Baseball players who had appeared in the 1952 Baseball Register and had died by 2009. On average, the nonsmilers had died at 73, compared with an average 80 years for those with a broad, genuine smile.

The accumulated evidence from 57 studies suggests that “depression substantially increases the risk of death, especially death by unnatural causes and cardiovascular disease” (Wulson et al., 1999). After following 63,469 women over a dozen years, researchers found more than a doubled rate of heart attack death among those who initially scored as depressed (Whang et al., 2009). In the years following a heart attack, people with high scores for depression are four times more likely than their low-scoring counterparts to develop further heart problems (Frasure-Smith & Leeper, 2005). Depression is disheartening.

Depressed people tend to smoke more and exercise less (Wholey et al., 2008), but stress itself is also disheartening:

- When following 17,415 middle-aged American women, researchers found an 88 percent increased risk of heart attacks among those facing significant work stress (Skopen et al., 2010).
- In Denmark, a study of 12,116 female nurses found that those reporting “much too high” work pressures had a 40 percent increased risk of heart disease (Allesoe et al., 2010).
- In the United States, a 10-year study of middle-aged workers found that involuntary job loss more than doubled their risk of a heart attack (Gallo et al., 2006). After a heart attack, stress and anxiety increase the risk of death or of another attack (Roest et al., 2010).

Research suggests that heart disease and depression may both result when chronic stress triggers persistent inflammation (Matthews, 2005; Miller & Blackwell, 2006). After a heart attack, stress and anxiety increase the risk of death or of another attack (Roest et al., 2010). As we have seen, stress disrupts the body’s disease-fighting immune system, enabling the body to focus its energies on fleeing or fighting the threat. Yet stress hormones enhance one immune response: the production of proteins that contribute to inflammation. Thus, people who experience social threats, including children raised in harsh families, are more prone to inflammation responses (Dickerson et al., 2009; Miller & Chen, 2010). Persistent inflammation can produce problems such as asthma or clogged arteries, and worsen depression (see FIGURE 44.4). Researchers are now uncovering the molecular mechanisms by which stress, in some people, activates genes that control inflammation (Cole et al., 2010).

We can view the stress effect on our disease resistance as a price we pay for the benefits of stress (FIGURE 44.5 on the next page). Stress invigorates our lives by arousing and motivating us. An unstressed life would hardly be challenging or productive.
CLOSE & ASSESS

Exit Assessment

Have students differentiate between Type A and Type B personalities. Make sure students recognize that the hostility a Type A personality feels when stressed is the main contributor to the negative health outcomes he or she experiences.

Behavioral medicine research provides a reminder of one of contemporary psychology’s overarching themes: Mind and body interact; everything psychological is simultaneously physiological. Psychological states are physiological events that influence other parts of our physiological system. Just pausing to think about biting into an orange section—the sweet, tangy juice from the pulpy fruit flooding across your tongue—can trigger salivation. As the Indian sage Santi Parva recognized more than 4000 years ago, “Mental disorders arise from physical causes, and likewise physical disorders arise from mental causes.” There is an interplay between our heads and our health. We are biopsychosocial systems.

Before You Move On

ASK YOURSELF
Are there changes you could make to avoid the persistent stressors in your life?

TEST YOURSELF
Which component of the Type A personality has been linked most closely to coronary heart disease?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.
Module 44 Review

How does stress make us more vulnerable to disease?

- Psychoneuroimmunologists study mind-body interactions, including psychophysiological illnesses, such as hypertension and some headaches.
- Stress diverts energy from the immune system, inhibiting the activities of its B and T lymphocytes, macrophages, and NK cells.
- Stress does not cause diseases such as AIDS and cancer, but by altering our immune functioning it may make us more vulnerable to them and influence their progression.

Multiple-Choice Questions

1. Which of the following best identifies any stress-related physical illness, such as hypertension and some headaches?
   a. Bacterial infection
   b. Psychoneuroimmunology
   c. Allergic reaction
   d. Psychophysiological illness
   e. Viral infection

2. What is North America’s leading cause of death?
   a. Psychosomatic disorders
   b. Coronary heart disease
   c. Cancer
   d. Depression
   e. Stroke

Practice FRQs

1. Explain the two types of people identified by Friedman and Rosenman in their study on stress responses and personality traits.

   **Answer**
   1 point: Type A people are competitive, hard-driving, impatient, verbally aggressive, and anger prone.
   1 point: Type B people are easygoing and relaxed.

2. Explain the difference between B lymphocytes and T lymphocytes.

   **Answer**
   2 points

Why are some of us more prone than others to coronary heart disease?

- Coronary heart disease, North America’s number one cause of death, has been linked with the reactive, anger-prone Type A personality.
- Compared with relaxed, easygoing Type B personalities, Type A people secrete more of the hormones that accelerate the buildup of plaque on the heart’s artery walls.
- Chronic stress also contributes to persistent inflammation, which heightens the risk of clogged arteries and depression.

Multiple-Choice Questions

1. Which of the following best identifies any stress-related physical illness, such as hypertension and some headaches?
   a. Bacterial infection
   b. Psychoneuroimmunology
   c. Allergic reaction
   d. Psychophysiological illness
   e. Viral infection

2. What is North America’s leading cause of death?
   a. Psychosomatic disorders
   b. Coronary heart disease
   c. Cancer
   d. Depression
   e. Stroke

3. What did a famous Harvard University public health study identify as a factor that doubles the risk of heart disease?
   a. Optimism
   b. Apathy
   c. Pessimism
   d. Competitiveness
   e. AIDS

Answer to Practice FRQ 2

1 point: B lymphocytes come from bone marrow and release antibodies that fight bacterial infections.

1 point: T lymphocytes form in the thymus and attack viruses and cancer cells.
Answers to Multiple-Choice Questions

1. b
2. b
3. d
4. d

Multiple-Choice Questions

1. Which theory explains that physiological needs create an aroused state that motivates an organism to reduce the need?
   a. Instinct theory
   b. Drive-reduction theory
   c. Achievement motivation
   d. Arousal theory
   e. Hierarchy of needs

2. Attempts to control social behavior by using the punishing effects of isolation is an example of
   a. attachment disorder
   b. ostracism
   c. exploitation
   d. wanting to belong
   e. conforming

3. What explains why, even when our biological needs are satisfied, we may still feel driven to experience stimulation?
   a. Incentive
   b. Homeostasis
   c. Instinct
   d. Arousal theory
   e. Physiology

4. Why does further weight loss come slowly following a rapid loss during the initial three weeks of a rigorous diet?
   a. The number of fat cells makes further weight loss impossible.
   b. When a person’s hunger increases, metabolism increases.
   c. When an obese person’s set point has been reached, weight loss increases dramatically.
   d. The body reacts as if it’s being starved and metabolic rates drop.
   e. An obese person cannot maintain a rigorous weight loss diet.
5. Research on semistarvation found that men who were given just enough food to stabilize their weight at 25 percent below their starting weight
   a. became obsessed with physical exercise.
   b. were more interpersonally outgoing.
   c. showed increases in mental cognition.
   d. were in a state of homeostasis.
   e. lost interest in social activities.

6. Which of the following is the best biological explanation for why the human body stores fat?
   a. Fat signals affluence and social status.
   b. Fat is a fuel reserve during periods when food is scarce.
   c. Fat is a display of abundant food sources.
   d. Fat keeps the body warm in winter climates.
   e. Fat combats the global epidemic of diabetes.

7. What do we call a need or desire that energizes and directs behavior?
   a. Incentive
   b. Refractory period
   c. Emotion
   d. Motivation
   e. Instinct

8. Which of the following actions is a violation of Maslow’s hierarchy of needs?
   a. A person who moves to a new city gets an apartment before beginning to make friends.
   b. A very hungry reality show contestant searches for food before trying to win a competition.
   c. A professor spends time socially with her colleagues before she works on her own research.
   d. An artist works to win a local award before spending time on his own personal projects.
   e. An athlete follows a “no pain, no gain” motto rather than stopping for rest and nourishment.

9. What term refers to the ability of the body’s physiological processes to maintain a balanced or constant internal state?
   a. Hierarchy of needs
   b. Basal metabolic rate
   c. Homeostasis
   d. Instinct
   e. Motivation

10. A person who eats excessively and never seems to feel full may have which of the following conditions?
    a. Tumor in the hypothalamus
    b. Too much insulin
    c. Stomach ulcer
    d. Stomach bypass surgery
    e. Too much of the hormone PYY

11. Which of the following is one of the stages of the sexual response cycle described by Masters and Johnson?
    a. Expulsion
    b. Plateau
    c. Attraction
    d. Compensation
    e. Depolarization

12. Emotions are a mix of consciously experienced thoughts, expressive behaviors, and physiological arousal. Which theory emphasized the importance of consciously experienced thoughts?
    a. Facial feedback theory
    b. James-Lange theory
    c. Arousal and performance theory
    d. Fight-or-flight theory
    e. Schachter-Singer two-factor theory

13. Surveys conducted with people who have high spinal cord injuries suggest to researchers that emotions are
    a. entirely cognitive, requiring no physical response to be intense.
    b. largely dependent upon our bodily responses and behaviors.
    c. mostly a social response to surrounding factors.
    d. mostly a cultural reaction to context.
    e. mostly psychological.

14. The stress hormones epinephrine and norepinephrine are released from where?
    a. Parasympathetic nervous system
    b. Hippocampus
    c. Brain stem
    d. Adrenal glands
    e. Hypothalamus

15. When hearing emotions conveyed in another language, what emotion can people most readily detect?
    a. Sadness
    b. Happiness
    c. Anger
    d. Fear
    e. Surprise

16. Brain scans and EEG recordings indicate that positive emotions are associated with high levels of activity in which brain section?
    a. Right temporal lobe
    b. Cerebellum
    c. Left frontal lobe
    d. Left temporal lobe
    e. Right parietal lobe
arousal is best for optimum function— that for most tasks a moderate level of 1 point: The Yerkes–Dodson law states labeling of that emotion.)
a physical arousal and a cognitive  
ence as long as the example includes  
e example of Hope's emotional experi- 
 Students may describe any  
 (Note:

17. Which one of the following statements about stress is true?  
a. Surgical wounds heal more slowly in stressed humans.  
b. Stress has no effect on those exposed to cold viruses.  
c. There is no correlation between stress and longevity.  
d. Stress makes us more resistant to infection and heart disease.  
e. Anxiety, irritation, and guilt all prompt very different physiological responses.

18. Which of the following statements about nonverbal expression is true?  
a. People blind from birth do not usually exhibit common facial expressions.  
b. The meaning of gestures is the same across cultures.  
c. Facial signs of emotion are generally understood across world cultures.  
d. People from different cultures have difficulty understanding nonverbal expressions.  
e. Nonverbal expression is not reliably interpreted within a culture.

19. Which psychological concept would predict that smiling warmly on the outside would cause you to feel better on the inside?  
a. Relative deprivation  
b. Mimicry  
c. Empathy  
d. Facial feedback  
e. Catharsis

20. After an alarming event, your temperature, blood pressure, and respiration are high, and you have an outpouring of hormones. Hans Selye would most likely guess that you are in which general adaptation syndrome phase?  
a. Exhaustion  
b. Resistance  
c. Immobilization  
d. Collapse  
e. Shock

Rubric for Free Response Question 2  
(Note: Students may describe any example of Hope's emotional experience as long as the example includes a physical arousal and a cognitive labeling of that emotion.)

1 point: The Yerkes–Dodson law states that for most tasks a moderate level of arousal is best for optimum functioning, but that for difficult tasks like the one Hope is facing, a slightly lower level of arousal will result in the best performance. If Hope can keep her arousal level at a moderate level, where she is "psyched up" for the game but not overly anxious, she will be able to give her best performance.  

1 point: Hope's need to connect or affiliate with others is mostly likely related to her sense of belongingness with her team and her desire to win the championship game. This need drives her desire to win the game and thus helps motivate her to make her best effort when faced with the difficult task of defeating the defending championship team.

1 point: According to the Schachter–Singer two-factor theory, as Hope plays in the game, she experiences an increase in physical arousal and this arousal along with the cognitive label Hope applies to the emotion will impact the intensity of the emotion she perceives. For example, if Hope scores a goal, she will most likely label this as an extremely joyous experience, and the combination of the intense physical arousal and the cognitive label will produce an especially powerful emotional experience.

Rubric for Free Response Question 1  
1 point: According to Maslow's hierarchy, Bill's decision to apply to the University of Michigan is the result of a need or drive (motivation) to achieve the higher psychological needs of belonging, esteem, self-actualization, or self-transcendence. Bill is able to focus on these higher-level needs because his physiological and safety needs have already been met.

1 point: According to the James-Lange theory, when Bill receives the letter in the mail, his heart races and his breathing increases, which causes his brain to automatically interpret this experience as the emotion of excitement.

1 point: According to the Cannon-Bard theory, when Bill receives the letter in the mail, his heart races and his breathing increases at the same time that he experiences the emotion of excitement. He simultaneously experiences an increase in physiological arousal and the emotion of happiness.

1 point: According to the Schachter-Singer two-factor theory, when Bill opens his letter, he experiences an increase in physical arousal and determines that he is experiencing happiness based on his memories and thoughts.

Free-Response Questions

1. Bill is applying for admission to the University of Michigan and has completed the entire process except for writing his application essay. He is very nervous about writing the essay because it is such an important part of the acceptance process and the topic he was assigned is very challenging. Bill may exhibit any emotion as long as the response includes a physical arousal and a cognitive labeling of that emotion.

2. Which psychological concept would predict that smiling warmly on the outside would cause you to feel better on the inside?  
a. Relative deprivation  
b. Mimicry  
c. Empathy  
d. Facial feedback  
e. Catharsis

Note:

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Chapter 8

Motivation, Emotion, and Stress

Rubric for Free Response Question 1

1 point: According to Maslow's hierarchy, Bill's decision to apply to the University of Michigan is the result of a need or drive (motivation) to achieve the higher psychological needs of belonging, esteem, self-actualization, or self-transcendence. Bill is able to focus on these higher-level needs because his physiological and safety needs have already been met.

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1 point: According to the Schachter-Singer two-factor theory, when Bill opens his letter, he experiences an increase in physical arousal and determines that he is experiencing happiness based on his memories and thoughts.

Note: Bill may exhibit any emotion as long as the physical arousal occurs prior to the experience of the emotion.

Rubric for Free Response Question 2

1 point: The Yerkes–Dodson law states that for most tasks a moderate level of arousal is best for optimum functioning, but that for difficult tasks like the one Hope is facing, a slightly lower level of arousal will result in the best performance. If Hope can keep her arousal level at a moderate level, where she is “psyched up” for the game but not overly anxious, she will be able to give her best performance.

1 point: Hope's need to connect or affiliate with others is mostly likely related to her sense of belongingness with her team and her desire to win the championship game. This need drives her desire to win the game and thus helps motivate her to make her best effort when faced with the difficult task of defeating the defending championship team.

1 point: According to the Schachter–Singer two-factor theory, as Hope plays in the game, she experiences an increase in physical arousal and this arousal along with the cognitive label Hope applies to the emotion will impact the intensity of the emotion she perceives. For example, if Hope scores a goal, she will most likely label this as an extremely joyous experience, and the combination of the intense physical arousal and the cognitive label will produce an especially powerful emotional experience.
Rubric for Free-Response Question 3

1 point: Research indicates that our social group can impact our eating behaviors. We are more likely to become and stay obese if we have obese friends. If Franz’s close friends are obese, social influence may work against his weight loss. However, if Franz’ friends work to maintain healthy body weights or if a friend tries to lose weight with him, social influence might help him succeed in losing weight. (pp. 402–403)

1 point: Our set point, the stable weight that our body tries to maintain by adjusting hunger and “fullness” signals, can be changed by slow, sustained changes in eating patterns and weight. If Franz loses weight too quickly, his set point might influence him to put the weight back on. If Franz makes more long-lasting changes to his eating and exercise habits, his set point could change, helping him maintain his weight loss. (pp. 398 and 402)

1 point: Studies indicate that sleep deprivation influences the levels of hormones and chemicals that help control hunger and satiation. Franz should make sure he is getting adequate sleep in order to help him achieve and maintain his weight loss. (p. 402)

1 point: Incentive theory describes the motivational influence of incentives, positive or negative stimuli that either attract or repel us toward or away from behaviors. Franz should analyze which foods “trigger” him to overeat, which foods are incentives to eat, and which help him maintain healthy eating habits. (pp. 391–392)