

Module 43

Stress and Health

Module Learning Objective

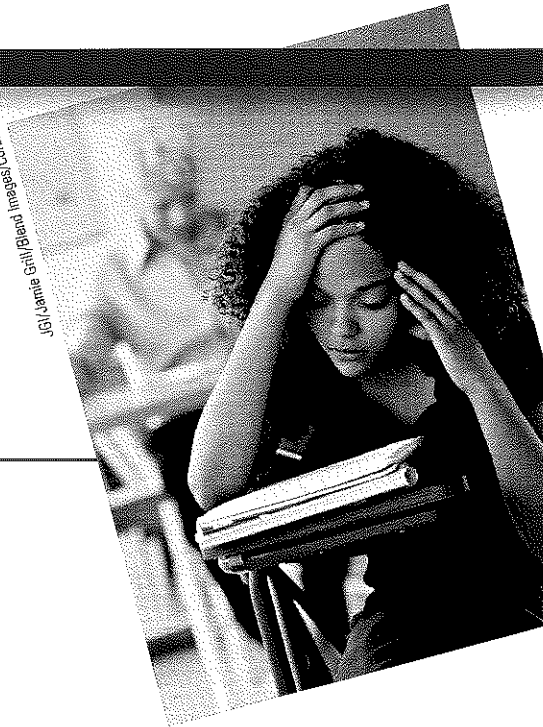
43-1 Identify events that provoke stress responses, and describe how we respond and adapt to stress.

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 disbelieving 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.

Jill Jamie Grill/Bland Images/Corbis



EYL

In Module 84, we take a close look at some ways we can reduce the stress in our lives, so that we can flourish in both body and mind.

AP Photo/Michigan State Police



Extreme stress Ben Carpenter experienced the wildest of rides after his wheelchair got stuck in a truck’s grille.

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 risking 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).

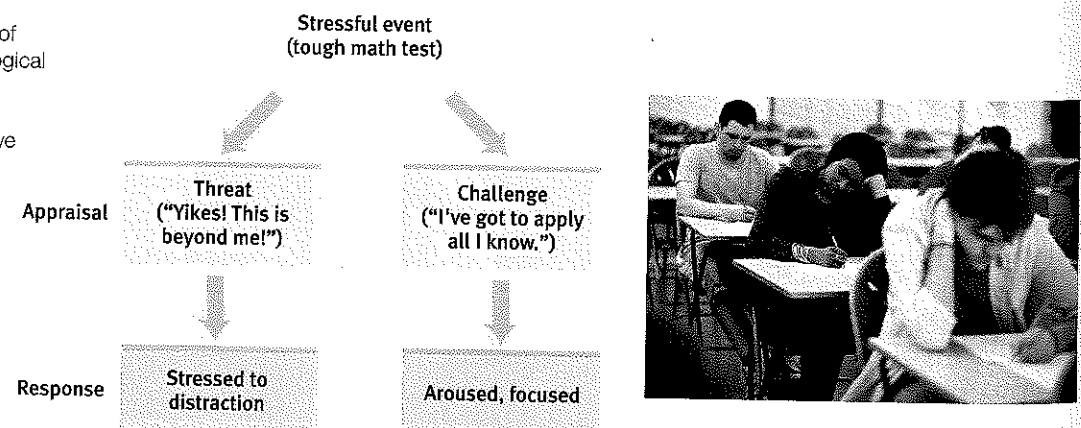
So there is an interplay between our heads and our health. Before exploring that interplay, let’s look more closely at stressors and stress reactions.

Stressors—Things That Push Our Buttons

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

stress the process by which we perceive and respond to certain events, called *stressors*, that we appraise as threatening or challenging.

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.



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 (Wahlberg, 2001). In the New York area, people were especially likely to report such symptoms, and sleeping pill prescriptions rose by a reported 28 percent (HMHL, 2002a; NSF, 2001). In the four months after Hurricane Katrina, New Orleans’ suicide rate reportedly tripled (Saulny, 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 (Markovizky & Samid, 2008). Such relocations may become increasingly common because of climate change in years to come.

Toxic stress Unpredictable large-scale events, such as the severe earthquake that devastated Haiti in 2010, trigger significant levels of stress-related ills. When an earthquake struck Los Angeles in 1994, sudden-death heart attacks increased fivefold. Most occurred in the first two hours after the quake and near its center and were unrelated to physical exertion (Muller & Verrier, 1996).

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; Strully, 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.

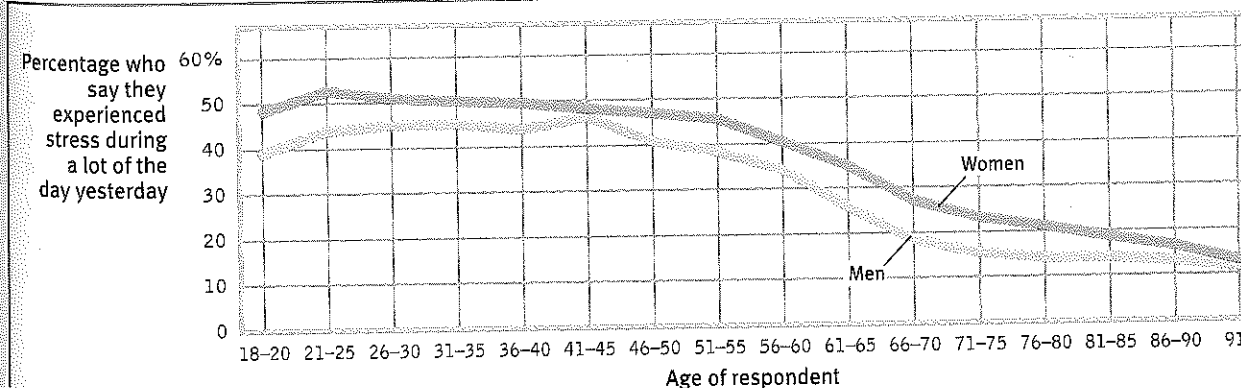


Figure 43.2
Age and stress A Gallup-Healthways survey of more than 650,000 Americans during 2008 and 2009 found daily stress highest among younger adults (Newport & Pelham, 2009).

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 take a toll on health and well-being.

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; Rostovsky et al., 2010; Swim 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 41.4) 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 *glucocorticoid* 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 intrudes. He named this response the **general adaptation syndrome (GAS)**, and he saw it as a three-phase process (FIGURE 43.3). Let's say you suffer a physical or an emotional trauma. In Phase 1, you have an *alarm reaction*, as your sympathetic nervous system is suddenly activated. Your heart rate zooms. Blood is diverted to your skeletal muscles. You feel the faintness of shock.

With your resources mobilized, you are now ready to fight back. During Phase 2, *resistance*, your temperature, blood pressure, and respiration remain high. Your adrenal glands

"You've got to know when to hold 'em; know when to fold 'em. Know when to walk away, and know when to run." —KENNY ROGERS, "THE GAMBLER," 1978

general adaptation syndrome (GAS) Selye's concept of the body's adaptive response to stress in three phases—alarm, resistance, exhaustion.

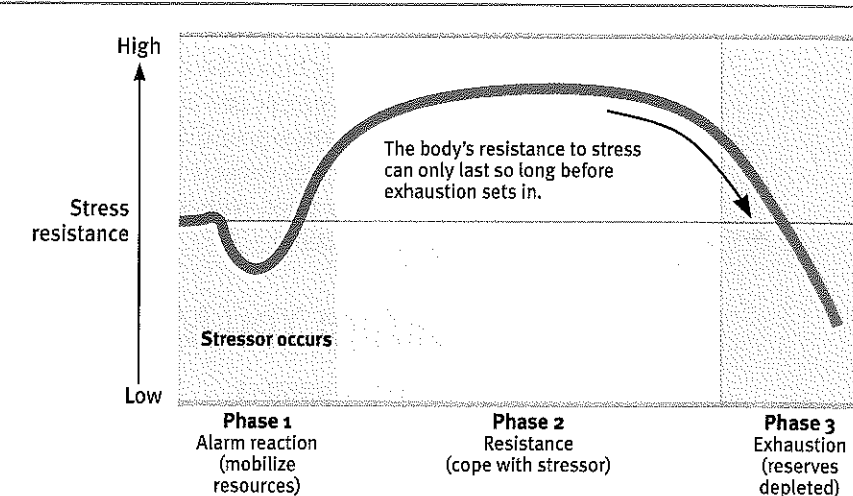


Figure 43.3

Selye's general adaptation syndrome When a gold and copper mine in Chile collapsed in 2010, family and friends rushed to the scene, fearing the worst. Many of those holding vigil outside the mine were nearly exhausted with the stress of waiting and worrying when, after 18 days, they received news that all 33 of the miners inside were alive and well.

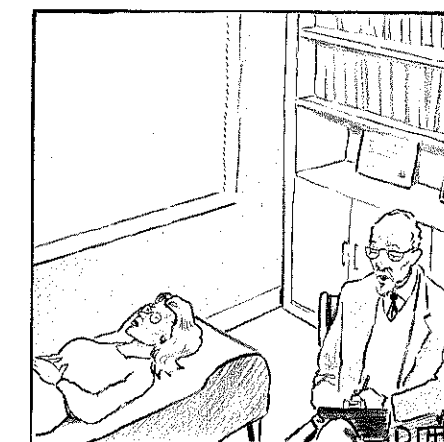
pump hormones into your bloodstream. You are fully engaged, summoning all your resources to meet the challenge.

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 chronological 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



"You may be suffering from what's known as full-nest syndrome."

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tend-and-befriend response under stress, people (especially women) often provide support to others (tend) and bond with and seek support from others (befriend).

(Campbell, 2010; Taylor, 2006). Gender differences in stress responses are reflected in brain scans: 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. Social isolation
 - d. Elevated hunger
 - e. Exhaustion

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.

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

(3 points)

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.