

# 01 - 14 Stress, Health, and Coping

## 14 Stress, Health, and Coping

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Janet was feeling near the end of her rope. All day long she had endured one hassle after another. At breakfast, she spilled orange juice on the only clean blouse she had. When she got to work, there were 32 email messages and 15 phone messages waiting for her. In the afternoon, her boss told her to prepare a financial report for the board meeting that was to occur at 9 a.m. the next morning, but her computer crashed and she could not access the financial records for her division. Tired and overwhelmed, when she got home, she called her mother for support, only to discover that her father had been hospitalized with chest pains. After hanging up, Janet felt disoriented, her heart was racing, and she began to get a migraine. The kind of stress Janet was experiencing is familiar to many of us – silly mistakes that cause stress, the stress of a demanding boss, the stress in our personal relationships. Exposure to stress can lead to painful emotions like anxiety or depression. It can also lead to physical illnesses, both minor and severe. Yet, people's reactions to stressful events differ widely: Some people faced with a stressful event develop serious psychological or physical problems, whereas other people faced with the same stressful event develop no problems and may even find the event challenging and interesting. In this chapter we discuss the concept of stress and the effects of stress on the mind and body. We also look at the differences between people's ways of thinking about and coping with stressful events, and how these differences contribute to adjustment. Stress has become a popular topic. The media often attribute unusual behavior or illness to burnout due to stress or a nervous breakdown resulting from stress. For example, when a celebrity attempts suicide, it is often said that he or she was burnt out from the pressures of public life. On university campuses, 'I'm so stressed out!' is a common claim. But what is stress? In general terms, stress refers to experiencing events that are perceived as endangering one's physical or psychological well-being. These events are usually referred to as stressors, and people's reactions to them are termed stress responses. There are some types of events that most people experience as stressful. We will describe the characteristics of such events and then describe the body's natural reaction to stress. This reaction is adaptive

when it is possible to flee from or attack a stressor, but it can become maladaptive when a stressor is chronic or uncontrollable. Stress can have both direct and indirect effects on health. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) CHAPTER OUTLINE CHARACTERISTICS OF STRESSFUL EVENTS Traumatic events Controllability Predictability Major changes in life circumstances Internal conflicts PSYCHOLOGICAL REACTIONS TO STRESS Anxiety Anger and aggression Apathy and depression Cognitive impairment PHYSIOLOGICAL REACTIONS TO STRESS The fight-or-flight response The physiology of PTSD How stress affects health PSYCHOLOGICAL FACTORS AND STRESS RESPONSES Psychoanalytic theory Behavioral theory Cognitive theory The type A pattern COPING SKILLS Problem-focused coping Emotion-focused coping CUTTING EDGE RESEARCH: USING NEW MEDIA TO IMPROVE PEOPLE'S HEALTH MANAGING STRESS Behavioral techniques Exercise Cognitive techniques Modifying type A behavior SEEING BOTH SIDES: IS UNREALISTIC OPTIMISM GOOD FOR YOUR HEALTH? 503

The study of how stress and other social, psychological, and biological factors come together to contribute to illness is known as behavioral medicine or health psychology. We will review research on how psychosocial factors interact with biological vulnerabilities to affect cardiovascular health and the functioning of the immune system. Finally, we will describe ways of managing stress to improve health. CHARACTERISTICS OF STRESSFUL EVENTS Countless events create stress. Some are major changes affecting large numbers of people – events such as war, nuclear accidents, and earthquakes. Others are major changes in the life of an individual – for instance, moving to a new area, changing jobs, getting married, losing a friend, suffering a serious illness. Everyday hassles can also be experienced as stressors – losing your wallet, getting stuck in traffic, arguing with your lecturer. Some stressors are acute: They only last a short time, such as when you are caught in an unusual traffic jam on the way to an important job interview. Other stressors are chronic: They go on for an extended period, even indefinitely, as when you are in an unsatisfying marriage. Finally, the source of stress can be within the individual, in the form of conflicting motives or desires. Events that are perceived as stressful can usually be classed into one or more of the following categories: traumatic events outside the usual range of human experience, uncontrollable or unpredictable events, events that represent major changes in life circumstances, or internal conflicts. In this section we look briefly at each of these categories. Traumatic events The most obvious sources of stress are traumatic events – situations of extreme danger that are outside the range of usual human experience. These include natural disasters, such as earthquakes and floods; disasters caused by human activity, such as wars and nuclear accidents; catastrophic accidents, such as car or plane crashes; and physical assaults, such as rape or attempted murder. Many people experience a specific series of psychological reactions after a traumatic event (Horowitz, 2003). At first, survivors are stunned and dazed and appear to be unaware of their injuries or of the danger. They may wander around in a disoriented state, perhaps putting themselves at risk for further injury. For example, an earthquake survivor may wander through buildings that are on the verge of collapse. In the next stage, survivors are still passive and unable to initiate even simple tasks, but they may follow orders readily. For example, days after the assault, a rape survivor may not even think to prepare food to eat, but if a friend calls and insists that they go out for food, she will comply. In the third stage, survivors become anxious and apprehensive, have difficulty in concentrating, and may repeat the story of the catastrophe over and over again. The survivor of a car crash may become extremely nervous near a car, may be unable to go back to work because of inability to concentrate, and may repeatedly tell friends about the details of the crash. <sup>a</sup> ISTOCKPHOTO.COM/CEVDET GÖKHAN PALAS The causes of stress vary from one person to the

next. What is overwhelming to one person may be exciting and challenging to another.

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©ISTOCKPHOTO.COM/MARGO HARRISON Traumatic events, such as accidents, are extremely stressful for many people. One type of traumatic event that is tragically common in our society is sexual abuse. The impact of rape and other types of sexual violence on the victim's emotional and physical health appears to be great. Several studies have found that in the first 6 months after a rape or other assault, women and men show high levels of depression, anxiety, dismay, and many other indicators of emotional distress (Faravelli et al., 2004; Schneiderman et al., 2005). For some people, this emotional distress declines over time. For others, however, emotional distress is longlasting. Children who are abused are at risk for emotional problems throughout childhood and into adulthood (Cicchetti & Toth, 2005). Fortunately, most of us never experience traumatic events. More common events can lead to stress responses, however. Four characteristics of common events lead to their being perceived as stressful: controllability, predictability, major changes in life circumstances, and internal conflicts. Of course, the degree to which an event is stressful differs for each individual. That is, people differ in the extent to which they perceive an event as controllable, predictable, and a challenge to their capabilities and self-concept, and it is largely these appraisals that influence the perceived stressfulness of the event (Lazarus & Folkman, 1984). Controllability The controllability of an event – the degree to which we can stop it or bring it about – influences our perceptions of stressfulness. The more uncontrollable an event seems, the more likely it is to be perceived as stressful (see Chapter 7). Major uncontrollable events include the death of a loved one, being laid off from work, and serious illness. Minor uncontrollable events include such things as having a friend refuse to accept your apology for some misdeed and being bumped off a flight because For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) CHARACTERISTICS OF STRESSFUL EVENTS the airline oversold tickets. One obvious reason uncontrollable events are stressful is that if we cannot control them, we cannot stop them from happening. As noted earlier, however, our perceptions of the controllability of events appear to be as important to our assessment of their stressfulness as the actual controllability of those events. In a classic experimental study, participants were shown color photographs of victims of violent deaths. The experimental group could terminate the viewing by pressing a button. The control participants saw the same photographs for the same length of time as the experimental group, but they could not terminate the exposure. (The length of time the control group saw the photographs was determined by the length of time the experimental group saw them.) The level of arousal or anxiety in both groups was determined by measuring galvanic skin response (GSR), a drop in the electrical resistance of the skin that is widely used as an index of autonomic arousal. The experimental group showed much less anxiety in response to the photographs than the control group, even though the two groups were exposed to the photographs for the same amount of time (Geer & Maisel, 1973). The belief that we can control events appears to reduce the impact of the events, even if we never exercise that control. This was demonstrated in a study in which two groups of participants were exposed to a loud, extremely unpleasant noise. Participants in one group were told that they could terminate the noise by pressing a button, but they were urged not to do so unless it was absolutely necessary. Participants in the other group had no control over the noise. None of the participants who had a control button actually pressed it, so the noise exposure was the same for both groups. Nevertheless, performance on subsequent problem-solving tasks was significantly worse for the group that had no control, indicating that they were more disturbed

by the noise than the group that had the potential for control (Glass & Singer, 1972). Predictability The predictability of an event – the degree to which we know if and when it will occur – also affects its stressfulness. Being able to predict the occurrence of a stressful event – even if the individual cannot control it – usually reduces the severity of the stress. As discussed in Chapter 7, laboratory experiments show that both humans and animals prefer predictable aversive events over unpredictable ones. In one study, rats were given a choice between a signaled shock and an unsignaled shock. If the rat pressed a bar at the beginning of a series of shock trials, each shock was preceded by a warning tone. If the rat failed to press the bar, no warning tones sounded during that series of trials. All of the rats quickly learned to press the bar, showing a marked preference for

506 CHAPTER 14 STRESS, HEALTH, AND COPING predictable shock (Abbott, Schoen, & Badia, 1984). Humans generally choose predictable over unpredictable shocks, too. They also show less emotional arousal and report less distress while waiting for predictable shocks to occur, and they perceive predictable shocks as less aversive than unpredictable ones of the same intensity (Katz & Wykes, 1985). How do we explain these results? One possibility is that a warning signal before an aversive event allows the person or animal to initiate some sort of preparatory process that acts to reduce the effects of a noxious stimulus. An animal receiving the signal that a shock is about to happen may shift its feet in such a way as to reduce the experience of the shock. A man who knows he is about to receive a shot in the doctor's office can try to distract himself to reduce the pain. A woman who hears warnings of an impending hurricane can board up her windows in an attempt to prevent damage to her house. Another possibility is that with unpredictable shock, there is no safe period, but with predictable shock, the organism (human or animal) can relax to some extent until the signal warns that shock is about to occur (Seligman & Binik, 1977). A real-life example of this phenomenon occurs when a boss who tends to criticize an employee in front of others is out of town on a business trip. The boss's absence is a signal to the employee that it is safe to relax. In contrast, an employee whose boss criticizes him unpredictably throughout the day and never goes out of town may chronically feel stressed. Some jobs, such as fire fighting and emergency-room medicine, are filled with unpredictability and are considered very stressful. Serious illnesses often are very unpredictable. One of the major problems faced by cancer patients who receive treatment is that they cannot be sure whether they have been cured until many years have passed. Every day they must confront the uncertainty of a potentially disastrous future. Even an event as overwhelmingly negative as torture can be affected by the extent to which victims feel that the episodes of torture are predictable. Victims who are able to predict the timing and type of torture they experience while being detained recover better once they are released than victims who perceive the torture as completely unpredictable (Basoglu & Mineka, 1992). Major changes in life circumstances Two pioneering stress researchers, Holmes and Rahe (1967), argued that any life change that requires numerous readjustments can be perceived as stressful. In an attempt to measure the impact of life changes, they developed the Life Events Scale shown in Table 14.1. The scale ranks life events from most stressful (death of a spouse) to least stressful (minor violations of the law). To arrive at this scale, the investigators examined thousands of interviews and medical histories to identify the kinds of For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) Table 14.1 The Life Events Scale This scale, also known as the Holmes and Rahe Social Readjustment Rating Scale, measures stress in terms of life changes. (Reprinted with permission from T. H. Holmes & R. H. Rahe (1967) 'The Social Readjustment Rating Scale', in the Journal of Psychosomatic Research, Vol. 11, No. 2, pp. 213–218. Copyright © 1967 Elsevier

Science.) Life event Value Death of spouse Divorce Marital separation Jail term Death of close family member Personal injury or illness Marriage Fired from job Marital reconciliation Retirement Change in health of family member Pregnancy Sex difficulties Gain of a new family member Business readjustment Change in financial state Death of a close friend Change to a different line of work Foreclosure of mortgage Change in responsibilities at work Son or daughter leaving home Trouble with in-laws Outstanding personal achievement Wife begins or stops work Begin or end school Change in living conditions Revision of personal habits Trouble with boss Change in residence Change in school Change in recreation Change in church activities Change in social activities Change in sleeping habits Change in eating habits Vacation Christmas Minor legal violations events that people found stressful. Because marriage appeared to be a critical event for most people, it was placed in the middle of the scale and assigned an arbitrary value of 50. The investigators then asked approximately

400 men and women of varying ages, backgrounds, and marital status to compare marriage with a number of other life events. They were asked such questions as 'Does the event call for more or less readjustment than marriage?' They were then asked to assign a point value to each event on the basis of their evaluation of its severity and the time required for adjustment. These ratings were used to construct the scale in Table 14.1. The Holmes and Rahe scale shown in Table 14.1 had a major influence on stress research, but it has also had many critics. Although positive events often require adjustment and hence are sometimes stressful, most research indicates that negative events have a much greater impact on psychological and physical health than positive events. In addition, the Holmes and Rahe scale assumes that all people respond to a given event in the same way, but there are large differences in how people are affected by events. Some of these differences are linked to age and cultural background (Masuda & Holmes, 1978). Also, some people do not find major changes or pressure situations stressful. Rather, they experience them as VASILY SMIRNOV j DREAMSTIME.COM Although marriage is a happy event, it can also be stressful. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) CHARACTERISTICS OF STRESSFUL EVENTS as challenging and are invigorated by them. Several subsequent researchers have proposed alternative measures of life stress that take into account these differences in how individuals view stress (e.g., Ferguson, Matthew, & Cox, 1999). Later we will discuss characteristics of individuals that affect whether they view situations as stressors or as challenges. Internal conflicts So far we have discussed only external events in which something or someone in the environment challenges our well-being. Stress can also be brought about by internal conflicts - unresolved issues that may be either conscious or unconscious. Conflict occurs when a person must choose between incompatible, or mutually exclusive, goals or courses of action. Many of the things people desire prove to be incompatible. You want to play on your university sports team but cannot put in the time required and still earn good grades. You want to join your friends for a pizza party but are afraid you will fail tomorrow's exam if you don't stay home and study. You don't want to go to your uncle's for dinner, but you also don't want to listen to your parents' complaints if you turn down the invitation. In each case, the two goals are incompatible because the action needed to achieve one automatically prevents you from achieving the other. Even if two goals are equally attractive - for example, you receive two good job offers - you may agonize over the decision and experience regrets after making a choice. This stress would not have occurred if you had been offered only one job. Conflict may also arise when two inner needs or motives are in opposition. In our society, the conflicts that are most pervasive and difficult to resolve generally occur between the following motives: I Independence versus dependence. Particularly when we are faced with a

difficult situation, we may want someone to take care of us and solve our problems. But we are taught that we must stand on our own. At other times we may wish for independence, but circumstances or other people force us to remain dependent. | Intimacy versus isolation. The desire to be close to another person and to share our innermost thoughts and emotions may conflict with the fear of being hurt or rejected if we expose too much of ourselves. | Cooperation versus competition. Our society emphasizes competition and success. Competition begins in early childhood among siblings, continues through school, and culminates in business and professional rivalry. At the same time, we are urged to cooperate and to help others.

508 CHAPTER 14 STRESS, HEALTH, AND COPING | Expression of impulses versus moral standards. Impulses must be regulated to some degree in all societies. We noted in Chapter 3 that much of childhood learning involves internalizing cultural restrictions on impulses. Sex and aggression are two areas in which our impulses frequently come into conflict with moral standards, and violation of these standards can generate feelings of guilt. These four areas present the greatest potential for serious conflict. Trying to find a workable compromise between opposing motives can create considerable stress. INTERIM SUMMARY | Stress refers to experiencing events that are perceived as endangering one's physical or psychological well-being. These events are usually referred to as stressors, and people's reactions to them are termed stress responses. | Traumatic events are events outside the normal range of people's experience that are highly distressing. Traumas such as rape can lead to a wide range of emotional and physical problems. | The controllability of a situation also affects how stressful it is. Our perceptions of controllability are as important as the actual controllability of the situation. | Unpredictable events are often perceived as stressful. | Some researchers argue that any major change can be stressful. | Internal conflicts - unresolved issues that may be conscious or unconscious - can cause stress. CRITICAL THINKING QUESTIONS 1 Consider the situations in your own life you find stressful. What are the characteristics of these situations that make them so stressful? 2 To what extent do you think the need for control is influenced by culture? PSYCHOLOGICAL REACTIONS TO STRESS Stressful situations produce emotional reactions ranging from exhilaration (when the event is demanding but manageable) to anxiety, anger, discouragement, and depression (see the Concept Review Table). If the stressful For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) CONCEPT REVIEW TABLE Reactions to stress Psychological reactions Anxiety Anger and aggression Apathy and depression Cognitive impairment Physiological reactions Increased metabolic rate Increased heart rate Dilation of pupils Higher blood pressure Increased breathing rate Tensing of muscles Secretion of endorphins and ACTH Release of extra sugar from the liver situation continues, our emotions may switch back and forth among any of these, depending on the success of our coping efforts. Let us take a closer look at some of the more common emotional reactions to stress. Anxiety The most common response to a stressor is anxiety. People who live through events that are beyond the normal range of human suffering (natural disasters, rape, kidnapping) sometimes develop a severe set of anxiety-related symptoms known as post-traumatic stress disorder (PTSD). There are four sets of symptoms of PTSD. The first set represents a deep detachment from everyday life. People report feeling completely numb to the world, as if they have no emotional reactions to anything. They feel estranged from others, as if they can no longer relate to even close family and friends. They also lose their interest in their former activities and may just sit around for hours at a time, apparently staring into nothingness. The second set of symptoms is a repeated reliving of the trauma. People may dream every night of the trauma and become afraid to go to sleep. Even while awake, they may mentally relive the trauma so vividly that they begin to behave as if they were

there. A former combat soldier, when he hears a jet flying low nearby, might hit the ditch, cover his head, and feel as though he is back in combat. A rape survivor might replay scenes from her trauma over and

over and see the face of her attacker in other men. The third set of symptoms includes sleep disturbances, difficulty in concentrating, and overalertness. Trauma survivors may act as though they are always vigilant for signs of the trauma recurring. They may find it impossible to concentrate on anything, including their work, conversations, or driving a car. Even if they are not having recurrent nightmares, they may have restless nights and wake up exhausted. Another symptom of PTSD that is not part of these three core sets of symptoms is survivor guilt – some people feel terribly guilty about surviving a trauma when others did not, even if they could not have saved other people. Post-traumatic stress disorder may develop immediately after the trauma, or it may be brought on by a minor stress experienced weeks, months, or even years later. It may last a long time. A study of victims of the 1972 flood that wiped out the U.S. community of Buffalo Creek, West Virginia, found that shortly after the flood, 63 percent of the survivors were suffering from PTSD symptoms. Fourteen years later, 25 percent still experienced PTSD symptoms (Green, Lindy, Grace, & Leonard, 1992). Another study of children in South Carolina who survived Hurricane Hugo in 1993 found that, three years after the hurricane, a third still experienced a sense of detachment and avoided thoughts or feelings associated with the hurricane. A quarter of the children were irritable and angry, and 20 percent experienced chronic physiological arousal (Garrison et al., 1995). A study of survivors of an earthquake in Turkey found that 23 percent of those who were at the epicenter had PTSD 14 months later, and 16 percent had PTSD plus depression (Basoglu et al., 2004). Similar rates of PTSD were found in survivors of a large earthquake in Taiwan (Lai et al., 2004). One of the largest natural disasters in recent history was the tsunami that struck south and southeast Asia on December 26, 2004. It is estimated that over 280,000 people were killed, 27,000 remain missing and are assumed dead, and 1.2 million people were displaced. In the village of Tamil Nadu, India, 7,983 people were killed, and 44,207 people had to be relocated to camps due to damage to their homes. Researchers found that 13 percent of adults in this area were suffering from PTSD two months after the tsunami (Kumar, Murhekar, Hutin, Subramanian, Ramachandran, & Gupte, 2007). A study of survivors of the tsunami from the western coastal regions of Phuket, Thailand found that 22 percent had symptoms of PTSD two weeks after the disaster, and 30 percent had symptoms of PTSD 6 months the disaster (Tang, 2007). Culture and gender appear to interact in interesting ways to influence vulnerability to PTSD. One study compared random community samples of survivors of Hurricane Andrew, which hit Florida in 1992, with survivors of Hurricane Paulina, which hit Acapulco, For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) PSYCHOLOGICAL REACTIONS TO STRESS <sup>a</sup> PICTURE CONTACT / ALAMY Survivors of wars and natural disasters often experience posttraumatic stress disorder. Mexico, in 1997 (Norris et al., 2001). These two hurricanes were similar in many ways, rated as Category 4 hurricanes and causing widespread property damage, physical injury, and death. Rates of PTSD symptoms were high in both countries. Women had more symptoms than men in both countries (see Figure 14.1), yet the difference in PTSD symptoms between Mexican women and men was much greater than the difference between American women and men. In addition, within the American sample, the difference in PTSD symptoms between non-Hispanic White women and men was significantly greater than the difference between African American women and men. Males Females Percentage of severe distress (PTSD) 40 23 19 14 6 Non-Hispanic White American African American Mexican Figure 14.1 Cultural and Sex Differences in PTSD. Sex

differences in rates of PTSD were greatest among Mexican Americans, followed by non-Hispanic White Americans, then least among African-Americans in a study of reactions to a hurricane. Adapted from Norris et al: Sex Differences in Symptoms of Posttraumatic Stress: Does Culture Play a Role?, *Journal of Traumatic Stress* 14 (1) pp 7-28.

510 CHAPTER 14 STRESS, HEALTH, AND COPING The researchers suggest that the relative strength of traditional sex roles across these three cultures (Mexican, non-Hispanic White, and African American) influenced the magnitude of sex differences in PTSD symptoms. There is more social pressure in Mexican culture than in American culture for women to be passive, self-sacrificing, and compliant and for men to be dominant, fearless, and strong (Vazquez-Nuttall, Romero-Garcia, & DeLeon, 1987). This may lead Mexican women to feel more helpless following a trauma and to be less able to get the material support they need, compared with Mexican men. Within American culture, there is some evidence that sex roles are more egalitarian among African Americans than among non-Hispanic Whites (Davenport & Yurick, 1991). Thus, African American women did not suffer much more PTSD than African American men. Traumas caused by humans, such as sexual or physical assault, terrorist attacks, and war, may be even more likely to cause PTSD than natural disasters, for at least two reasons. First, such traumas challenge our basic beliefs about the goodness of life and other people, and when these beliefs are shattered, PTSD is more likely to occur (Janoff-Bulman, 1992). Second, human-caused disasters often strike individuals rather than whole communities, and suffering through a trauma alone seems to increase a person's risk of experiencing PTSD. Studies of rape survivors have found that about 95 percent experience post-traumatic stress symptoms severe enough to qualify for a diagnosis of the disorder in the first two weeks following the rape (see Figure 14.2).

Weeks since the rape	Percent reporting PTSD symptoms
0	95
1	90
2	70
3	50
4	30
5	10
6	3
7	5
8	7
9	9
10	10
11	11
12	12

Figure 14.2 Post-Traumatic Symptoms in Rape. Almost all women who have been raped show symptoms of posttraumatic stress disorder severe enough to be diagnosed with PTSD in the first or second week following the rape. Over the 3 months following the rape, the percentage of women continuing to show PTSD declines. However, almost 50% of women continue to be diagnosed with PTSD 3 months after a rape. (After Foa & Riggs, 1995) For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) About 50 percent still qualify for the diagnosis three months after the rape. As many as 25 percent still suffer from PTSD four to five years after the rape (Foa & Riggs, 1995; Resnick, Kilpatrick, Dansky, & Sanders, 1993). Post-traumatic stress disorder became widely accepted as a diagnostic category because of difficulties experienced by war veterans. In World War I it was called 'shell shock' and in World War II 'combat fatigue'. U.S. veterans of the Vietnam War seemed especially prone to develop the long-term symptoms we have described. The U.S. National Vietnam Veterans Readjustment Study found that nearly half a million Vietnam veterans still suffered from PTSD 15 years after their military service (Schlenger et al., 1992). More recent and ongoing wars and conflicts have resulted in PTSD, however, both for soldiers and for civilians caught in these conflicts. Studies of U.S. Army soldiers and Marines deployed to Iraq have found that approximately 12 to 13 percent could be diagnosed with PTSD (Erbes et al., 2007). The citizens of countries besieged by war and violence are at even higher risk for PTSD. The Afghan people have endured decades of war and occupation, the repressive regime of the Taliban, and then the bombing of their country by the coalition forces after the attacks on the World Trade Center and the Pentagon in the United States. Thousands of Afghans have been killed, injured, or displaced from their homes. Thousands still live in make-shift tents on a barren landscape without adequate food and water. Research with Afghani citizens has found that approximately 20 percent can be diagnosed with PTSD (Scholte et al., 2004). Women

may be especially likely to suffer PTSD because the Taliban deprived them of even the most basic human rights, killed many of their husbands and other male relatives, and then made it impossible for them to survive without these men. A study of women living in Kabul under the Taliban regime found that 84 percent had lost at least one family member in war, 69 percent reported that they or a family member had been detained and abused by Taliban militia, and 68 percent reported extremely restricted social activities (Rasekh et al., 1998). Forty-two percent of these women were diagnosed with PTSD, and over 90 percent of the women reported some symptoms of PTSD (see also Scholte et al., 2004). People from Southeast Asia (Vietnamese, Cambodians, Laotians, and Hmong) have undergone decades of civil war, invasions by other countries, and death at the hands of despots. In the few years that Pol Pot and the Khmer Rouge ruled Cambodia (1975–1979), perhaps one-third of Cambodia's 7 million people died. Many others were tortured, starved, and permanently separated from their families. Hundreds of thousands of Southeast Asians fled to Thailand, Europe, the United States, and Canada. Unfortunately, many of these refugees faced further trauma, being imprisoned in refugee camps for years, often separated from their families (Kinzie, 2001). Studies of

refugees suggest that as many as half suffer PTSD, and these symptoms may persist for years if untreated (Kinzie, 2001). The wars in the former Yugoslavia begun in the 1990s were marked by 'ethnic cleansing' – the torture and slaughter of thousands and displacement of millions of former Yugoslavians. This campaign was one of the most brutal in history, with many atrocities, concentration camps, organized mass rapes, and neighbors murdering neighbors. This woman's story is far too common: Case Study: A woman in her 40s worked the family farm in a rural village until the day the siege began, when mortar shells turned most of their house to rubble. A few months before, she and her husband had sent their son away to be with relatives in Slovenia. The morning after the shelling, the Chetniks – Serbian nationalist forces – came and ordered everyone to leave their houses at once. Many neighbors and friends were shot dead before the woman's eyes. She and her husband were forced to sign over the title to their house, car, and bank deposits – and watched as the looting began. Looters included neighbors who were their friends. Over the next few days they traveled back from the Muslim ghetto to their land to feed the animals. One day, as she and her husband stood in the garden, the Chetniks captured them. Her husband was taken away with other men. For the next 6 months she did not know if he was dead or alive. She spent days on transport trains with no food or water, where many suffocated to death beside her. On forced marches she had to step over the dead bodies of friends and relatives. Once her group was forced across a bridge that was lined with Chetnik machine gunners randomly shooting to kill and ordering them to throw all valuables over the edge into nets. She spent weeks in severely deprived conditions in a big tent with many women and children, where constant sobbing could be heard. When she herself could not stop crying she thought that something had broken in her head and that she had gone 'crazy'. Now she says, 'I will never be happy again.' When alone, everything comes back to her. But when she is with others or busy doing chores, she can forget. 'My soul hurts inside, but I'm able to pull it together.' She is able to sleep without nightmares only by using a nightly ritual: 'I lie down and go through every step of the house in Bosnia – the stable, everything they took, the rugs, the horses, the doors. I see it all again.' (Weine et al., 1995, p. 540) A study of Bosnian refugees conducted just after they resettled in the United States found that 65 percent suffered from PTSD, with older refugees more vulnerable to PTSD than younger refugees (Weine et al., 1995; see also Cardozo, Vergara, Agani, & Cotway, 2000). A follow-up study of these refugees 1 year later found that 44 percent were still suffering from PTSD (Weine et al., 1998). For more

Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) PSYCHOLOGICAL REACTIONS TO STRESS Many refugees from Bosnia and other war-torn countries report having been tortured before they escaped their homeland, and the experience of torture significantly increases the chances that an individual will develop PTSD (Basoglu & Mineka, 1998; Shrestha et al., 1998). Torture survivors who were political activists appear less prone to develop PTSD than those who were not political activists (Basoglu et al., 1997). Political activists appeared more psychologically prepared for torture than others because they expected at some time to be tortured, often had previous experience with torture, and had a belief system whereby torture was viewed merely as an instrument of repression.

**Anger and aggression** Another common reaction to a stressful situation is anger, which may lead to aggression. Laboratory studies have shown that some animals behave aggressively in response to a variety of stressors, including overcrowding, electric shock, and failure to receive an expected food reward. If a pair of animals is shocked in a cage from which they cannot escape, they begin fighting when the shock starts and stop fighting when it ends. Children often become angry and exhibit aggressive behavior when they experience frustration. The frustration-aggression hypothesis assumes that whenever a person's efforts to reach a goal are blocked, an aggressive drive is induced that motivates behavior designed to injure the object - or person - causing the frustration. Although research has shown that aggression is not an inevitable response to frustration, it certainly is a frequent one. When one child takes a toy from another, the second child is likely to attack the first in an attempt to regain the toy. In the late 1980s, some adults frustrated by interminable traffic jams on hot Los Angeles freeways began shooting at one another. Fortunately, adults usually express their aggression verbally rather than physically; they are more likely to exchange insults than blows. Direct aggression toward the source of frustration is not always possible or wise. Sometimes the source is vague and intangible. The person does not know what to attack but feels angry and seeks an object on which to vent these feelings. Sometimes the individual responsible for the frustration is so powerful that an attack would be dangerous. When circumstances block direct attack on the cause of frustration, aggression may be displaced: The aggressive action may be directed toward an innocent person or object rather than toward the actual cause of the frustration. A man who is reprimanded at work may take out unexpressed resentment on his family. A student who is angry at her lecturer for an unfair grade may blow up at her roommate. A child frustrated by experiences at school may resort to vandalism of school property.

512 CHAPTER 14 STRESS, HEALTH, AND COPING **Apathy and depression** Although aggression is a frequent response to frustration, the opposite response, withdrawal and apathy, is also common. If the stressful conditions continue and the individual is unable to cope with them, apathy may deepen into depression. The theory of learned helplessness (Seligman, 1975) explains how experience with uncontrollable negative events can lead to apathy and depression (see also Chapter 7). A series of experiments showed that dogs placed in a shuttle box (an apparatus with two compartments separated by a barrier) quickly learn to jump to the opposite compartment to escape a mild electric shock delivered to their feet through a grid on the floor. If a light is turned on a few seconds before the grid is electrified, the dogs can learn to avoid the shock by jumping to the safe compartment when signaled by the light. However, if the dog has previously been confined in another enclosure where shocks were unavoidable and inescapable - so that nothing the animal did terminated the shock - it is very difficult for the dog to learn the avoidance response in a new situation. The animal simply sits and endures the shock in the shuttle box, even though an easy jump to the opposite compartment would eliminate discomfort. Some dogs never learn, even if the

experimenter demonstrates the proper procedure by carrying them over the barrier. The experimenters concluded that the animals had learned through prior experience that they were helpless to avoid the shock and therefore gave up trying to do so, even in a new situation. The animals were unable to overcome this learned helplessness (Overmeier & Seligman, 1967). Some humans also appear to develop learned helplessness, characterized by apathy, withdrawal, and inaction, in response to uncontrollable events. Not all do, however. The original learned helplessness theory has had to be modified to take into account the fact that although some people become helpless after uncontrollable events, others are invigorated by the challenge posed by such events (Wortman & Brehm, 1975). This modified theory will be discussed later in the chapter. The original learned helplessness theory is useful, however, in helping us understand why some people seem to give up when they are exposed to difficult events. For example, the theory has been used to explain why prisoners in Nazi concentration camps did not rebel against their captors more often: They had come to believe that they were helpless to do anything about their situation and therefore did not try to escape. Similarly, women whose husbands beat them frequently may not try to escape. They often say that they feel helpless to do anything about their situation because they fear what their husbands would do if they tried to leave or because they do not have the economic resources to support themselves and their children. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

**Cognitive impairment** In addition to emotional reactions, people often show substantial cognitive impairment when faced with serious stressors. They find it hard to concentrate and to organize their thoughts logically. They may be easily distracted. As a result, their performance on tasks, particularly complex tasks, tends to deteriorate. This cognitive impairment may come from two sources. High levels of emotional arousal can interfere with the processing of information, so the more anxious, angry, or depressed we are after experiencing a stressor, the more likely we are to exhibit cognitive impairment. Cognitive impairment may also result from the distracting thoughts that go through our heads when we are faced with a stressor. We contemplate possible sources of action, worry about the consequences of our actions, and berate ourselves for not being able to handle the situation better. For instance, while trying to complete a test, students who suffer from test anxiety tend to worry about possible failure and about their inadequacies. They can become so distracted by these negative thoughts that they fail to follow instructions and neglect or misinterpret information. As their anxiety mounts, they have difficulty retrieving facts that they have learned well. Cognitive impairment often leads people to adhere rigidly to behavior patterns because they cannot consider alternative patterns. People have been trapped in flaming buildings because they persisted in pushing against exit doors that opened inward; in their panic, they failed to consider other possible means of escape. Some people resort to old, childlike behavior patterns that are not appropriate to the situation. A cautious person may become even more cautious and withdraw entirely, whereas an aggressive person may lose control and strike out heedlessly in all directions.

**INTERIM SUMMARY**

- 1 Anxiety is a common response to stress. Some people develop a severe anxiety disorder called post-traumatic stress disorder.
- 2 Some people become angry in response to stress and may become aggressive.
- 3 Withdrawal, apathy, and depression may result from stress. Some people develop learned helplessness, which is characterized by passivity and inaction and an inability to see opportunities to control their environment.
- 4 Some people develop cognitive impairment when stressed and become unable to think clearly.

**CRITICAL THINKING QUESTIONS**

- 1 What kinds of things can family members or friends do to help the survivor of a trauma cope as well as possible with the psychological aftermath of the trauma?
- 2

Do you think some people are especially prone to develop PTSD following a trauma? If so, why might they be more vulnerable?

### PHYSIOLOGICAL REACTIONS TO STRESS

The body reacts to stressors by initiating a complex sequence of responses. If the perceived threat is resolved quickly, these emergency responses subside, but if the stressful situation continues, a different set of internal responses occurs as we attempt to adapt. In this section we examine these physiological reactions in detail.

#### The fight-or-flight response

Whether you fall into an icy river, encounter a knifewielding assailant, or are terrified by your first parachute jump, your body responds in similar ways. Regardless of the stressor, your body automatically prepares to handle the emergency. That this is called the fight-or-flight response – the body’s mobilization to attack or flee from a threatening situation. Energy is needed right away, so the liver releases extra sugar (glucose) to fuel the muscles, and hormones are released that stimulate the conversion of fats and proteins into sugar. The body’s metabolism increases in preparation for expending energy on physical action. Heart rate, blood pressure, and breathing rate increase, and the muscles tense. At the same time, certain unessential activities, such as digestion, are curtailed. Saliva and mucus dry up, thereby increasing the size of the air passages to the lungs, and an early sign of stress is a dry mouth. The body’s natural painkillers, endorphins, are secreted, and the surface blood vessels constrict to reduce bleeding in case of injury. The spleen releases more red blood cells to help carry oxygen, and the bone marrow produces more white corpuscles to fight infection. Most of these physiological changes result from activation of two neuroendocrine systems controlled by the hypothalamus: the sympathetic system and the adrenalcortical system. The hypothalamus has been called the brain’s stress center because of its dual function in emergencies. Its first function is to activate the sympathetic division of the autonomic nervous system (see Chapter 2). The hypothalamus transmits nerve impulses For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

### PHYSIOLOGICAL REACTIONS TO STRESS

to nuclei in the brain stem that control the functioning of the autonomic nervous system. The sympathetic division of the autonomic system acts directly on muscles and organs to produce increased heart rate, elevated blood pressure, and dilated pupils. The sympathetic system also stimulates the inner core of the adrenal glands (the adrenal medulla) to release the hormones epinephrine (adrenaline) and norepinephrine into the bloodstream. Epinephrine has the same effect on the muscles and organs as the sympathetic nervous system (for example, it increases heart rate and blood pressure) and thus serves to perpetuate a state of arousal. Norepinephrine, through its action on the pituitary gland, is indirectly responsible for the release of extra sugar from the liver (see Figure 14.3). The hypothalamus carries out its second function, activation of the adrenal-cortical system, by signaling the pituitary gland to secrete adrenocorticotrophic hormone (ACTH), the body’s ‘major stress hormone’ (see Chapter 2). ACTH stimulates the outer layer of the adrenal glands (the adrenal cortex), resulting in the release of a group of hormones (the major one is cortisol) that regulate the blood levels of glucose and certain minerals. The amount of cortisol in blood or urine samples is often used as a measure of stress. ACTH also signals other endocrine glands to release about 30 hormones, each of which plays a role in the body’s adjustment to emergency situations. In groundbreaking work that remains influential today, researcher Hans Selye (1978) described the physiological changes we have just discussed as part of a general adaptation syndrome, a set of responses that is displayed by all organisms in response to stress. The general adaptation syndrome has three phases (see Figure 14.4). In the first phase, alarm, the body mobilizes to confront a threat by triggering sympathetic nervous system activity. In the second phase, resistance, the organism attempts to cope with the threat by fleeing it or fighting it. The third phase, exhaustion, occurs if the organism is unable to flee from or fight the threat and depletes its physiological resources in attempting to do so. Selye argued that a

wide variety of physical and psychological stressors can trigger this response pattern. He also argued that repeated or prolonged exhaustion of physiological resources, due to exposure to prolonged stressors that one cannot flee from or fight, is responsible for a wide array of physiological diseases, which he called diseases of adaptation. He conducted laboratory studies in which he exposed animals to several types of prolonged stressors, such as extreme cold and fatigue, and found that regardless of the nature of the stressor, certain bodily changes inevitably occurred: enlarged adrenal glands, shrunken lymph nodes, and stomach ulcers. These changes decrease the organism's ability to resist other stressors, including infectious and disease-producing agents. As we will see later, chronic arousal can make both animals and people more susceptible to illness.

The physiology of PTSD In our discussion of PTSD, we emphasized the psychological consequences of trauma. Recent work on PTSD has also focused on apparent physiological changes that trauma survivors experience. People with PTSD are more physiologically reactive to situations that remind them of their trauma (Southwick, Yehuda, & Wang, 1998). This activity includes changes in several neurotransmitters and hormones involved in the fight-or-flight response. In addition, studies using positron emission tomography (PET) have found some differences between PTSD sufferers and controls in activity levels in parts of the brain involved in the regulation of emotion and the fight-or-flight response (Balenger et al., 2004; Nutt & Malizia, 2004). While imagining combat scenes, Adrenal cortex Adrenal medulla Sympathetic nervous system Neural impulses activate various glands and smooth muscles Stress hormones carried via blood stream to relevant organs and muscles Pituitary gland Stressor Fight-or-flight response 3 4 5 Hypothalamus Figure 14.3 The Fight-or-Flight Response. A stressful situation activates the hypothalamus, which, in turn, controls two neuroendocrine systems: the sympathetic system (shown in orange) and the adrenal-cortical system (shown in green). The sympathetic nervous system, responding to neural impulses from the hypothalamus (1), activates various organs and smooth muscles under its control (2). For example, it increases heart rate and dilates the pupils. The sympathetic nervous system also signals the adrenal medulla (3) to release epinephrine and norepinephrine into the bloodstream (4). The adrenal-cortical system is activated when the hypothalamus secretes CRF, a chemical that acts on the pituitary gland, which lies just below the hypothalamus (5). The pituitary gland, in turn, secretes the hormone ACTH, which is carried via the bloodstream to the adrenal cortex (6), where it stimulates the release of a group of hormones, including cortisol, that regulate blood glucose levels (7). ACTH also signals the other endocrine glands to release some 30 hormones. The combined effects of the various stress hormones carried via the bloodstream plus the neural activity of the sympathetic division of the autonomic nervous system constitute the fight-or-flight response. CHAPTER 14 STRESS, HEALTH, AND COPING For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

combat veterans with PTSD show increased blood flow in the anterior cingulate gyrus and the amygdala – areas of the brain that may play a role in emotion and memory. In contrast, combat veterans without PTSD did not show increases in blood flow in these regions while imagining combat scenes (see Figure 14.5; Shin et al., 1997). Some studies also show damage to the hippocampus among PTSD patients (Figure 14.6; Bremner et al., 2000; Villareal et al., 2002). The hippocampus is involved in memory. Damage to it may result in some of the memory problems that PTSD sufferers report. It is not clear whether these neurobiological abnormalities in PTSD sufferers is a cause or a consequence of their disorder. Deterioration of the hippocampus could be

the result of extremely high levels of cortisol at the time of the trauma. Interestingly, however, resting levels of cortisol among PTSD sufferers (when they are not being exposed to reminders of their trauma) tend to be lower than among people without PTSD (Yehuda, 2004). Because cortisol may act to shut down sympathetic nervous system activity after stress, the lower levels of cortisol among PTSD sufferers may result in prolonged activity of the sympathetic nervous system following stress. As a result, they may more easily develop a conditioned fear of stimuli associated with the trauma and subsequently develop PTSD. One longitudinal study assessed cortisol levels in people who had been injured in a traffic accident one to two hours previously (Yehuda, McFarlane, & Shaley, 1998). Six months later, these people were evaluated for the presence of PTSD. Those who did develop the disorder had shown cortisol levels immediately after the trauma that were significantly lower than those who did not develop the disorder. Similar results were found in a study of rape survivors (Resnick et al., 1995). These data suggest that people who develop PTSD have lower baseline levels of cortisol before they experience their trauma and possibly that abnormally low cortisol levels contribute to the development of PTSD.

How stress affects health Attempts to adapt to the continued presence of a stressor may deplete the body's resources and make it vulnerable to illness. The wear and tear on the body that results from chronic overactivity of the physiological response to stress is referred to as *allostatic load*. Chronic stress can lead to physical disorders such as ulcers, high blood pressure, and heart disease. It may also impair the immune system, decreasing the body's ability to fight invading bacteria and viruses (Delahanty, Dougall, Browning, Hyman, & Baum, 1998). Indeed, doctors estimate that emotional stress plays an important role in more than half of all medical problems. Psychophysiological disorders are physical disorders in which emotions are believed to play a central role. A common misconception is that people with psychophysiological disorders are not really sick and do not need Level of normal resistance Time More Less Alarm Resistance Exhaustion Figure 14.4 The General Adaptation Syndrome. According to Hans Selye, the body reacts to a stressor in three phases. In the first phase, alarm, the body mobilizes to confront the threat, which temporarily expends resources and lowers resistance. In the resistance phase, the body actively confronts the threat, and resistance is high. If the threat continues, the body moves into the exhaustion phase. Figure 14.5 PTSD and Blood Flow in the Brain. Studies using positron emission tomography show greater blood flow in the anterior cingulate and amygdala in combat veterans with PTSD than those without PTSD. (Shin, Kosslyn, Alpert, Rauch, Macklin & Pitman (1997). 'Visual Imagery and Perception in Posttraumatic Stress Disorder: A Positron Emission Tomographic Investigation'. © Archives of General Psychiatry 54, 233-241.) Photos courtesy of Dr. Lisa Shin. **PHYSIOLOGICAL REACTIONS TO STRESS** For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

medical attention. On the contrary, the symptoms of psychophysiological illness reflect physiological disturbances associated with tissue damage and pain. A peptic ulcer caused by stress is indistinguishable from an ulcer caused by a factor unrelated to stress, such as longterm heavy usage of aspirin. Traditionally, research in psychophysiology focused on such illnesses as asthma, hypertension (high blood pressure), ulcers, colitis, and rheumatoid arthritis. Researchers looked for relationships between specific illnesses and characteristic attitudes toward, or ways of coping with, stressful life events. For example, individuals with hypertension were said to feel that life is threatening and that they must therefore be on guard at all times. Those suffering from colitis were believed to be angry but unable to express their anger. However, most studies that reported characteristic attitudes to be related to specific illnesses have not been replicated (Overmier & Murison, 1998). Thus, the hypothesis that people who react to stress in similar ways will be

vulnerable to the same illnesses has generally not been confirmed. An important exception is research on coronary heart disease and Type A behavior patterns, as we will see shortly. Coronary heart disease The overarousal caused by chronic stressors may contribute to coronary heart disease. Coronary heart disease (CHD) occurs when the blood vessels that supply the heart muscles are narrowed or closed by the gradual buildup of a hard, fatty substance called plaque, blocking the flow of oxygen and nutrients to the heart. This can lead to pain, called angina pectoris, that radiates across the chest and arm. When the flow of oxygen to the heart is completely blocked, it can cause a myocardial infarction or heart attack. Coronary heart disease is a leading cause of death and chronic illness across the world. Since 1990, more people have died from coronary heart disease than from any other cause (WHO, 2007). There seems to be a genetic contribution to coronary heart disease: People with family histories of CHD are at increased risk for the disease. But 80 to 90 percent of people dying from coronary heart disease have one or more major risk factors that are affected by lifestyle choices, such as high blood pressure, high serum cholesterol, diabetes, smoking, and obesity (WHO, 2007). As we discuss in the Cutting Edge Research feature later in this chapter, new media, such as the Internet, are being used to help people change their behaviors (stop smoking, lose weight, exercise) in ways that will reduce their risk for coronary heart disease. A study of 30,000 people in 52 countries found that about a third of the risk for heart disease is connected to the stressfulness of people's environments (Rosengren et al., 2004; Yusuf et al., 2004). People in high-stress jobs are at increased risk for CHD, particularly if their jobs are highly demanding but provide them little control (Hitsanen, Elovainio, Pulkki-Raback, Keskivaara, Raitakari, Keltikangas-Jarvinen, 2005; Schneiderman et al., 2005). An example of such a job is an assembly line in which rapid, high-quality production is expected and the work is machine-paced rather than self-paced. In one study, 900 middle-aged men and women were followed over a ten-year period and examined for the development of heart disease. Two independent methods – occupational titles and the participants' reports of their feelings about their jobs – were used to classify workers along the dimensions of job demand and job control. The results showed that both men and women in occupations classified as 'high strain' (high demand combined with low control) had a risk of coronary heart disease 1.5 times greater than the risk faced by those in other occupations (Karasek, Baker, Marxer, Ahlbom, & Theorell, 1981; Karasek, Theorell, Schwartz, Pieper, & Alfredsson, 1982; Pickering et al., 1996). A demanding family life in addition to a stressful job can adversely affect a woman's cardiovascular health. Employed women in general are not at higher risk for CHD than homemakers. However, employed mothers are more likely to develop heart disease. The likelihood of disease increases with the number of children for working women. Figure 14.6 PTSD and the Hippocampus. Studies using magnetic resonance imaging show deterioration in the hippocampus of people with PTSD (right scan) compared with people without PTSD (left scan). (From Bremner, 1998) Courtesy J. Douglas Bremner, MD CHAPTER 14 STRESS, HEALTH, AND COPING For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

women but not for homemakers (Haynes & Feinleib, 1980). Yet women who have flexibility in and control over their work, and a good income so that they can afford to hire help with housecleaning and child-care tasks, seem not to suffer as much either physically or psychologically from their role overload (Lennon & Rosenfield, 1992; Taylor, 1999). Experimental studies with animals have shown that disruption of the social environment can induce pathology that resembles coronary artery disease (Manuck, Kaplan, & Matthews, 1986; Sapolsky, 2007). Some of these experiments have been conducted with a type of macaque monkey whose social organization involves the establishment of stable hierarchies of social dominance: Dominant and submissive animals can be

identified within a given group on the basis of the animals' social behavior. The introduction of unfamiliar monkeys into an established social group is a stressor that leads to increased aggressive behavior as group members attempt to reestablish a social dominance hierarchy (Manuck, Kaplan, & Matthews, 1986). In these studies, some monkey groups remained stable with fixed memberships, and other groups were stressed by the repeated introduction of new members. After about two years under these conditions, the high-ranking or dominant males in the unstable social condition showed more extensive atherosclerosis than the subordinate males (Sapolsky, 2007).

The immune system A relatively new area of research in behavioral medicine is psychoneuroimmunology, the study of how the body's immune system is affected by stress and other psychological variables. By means of specialized cells called lymphocytes, the immune system protects the body from disease-causing micro-organisms. It affects the individual's susceptibility to infectious diseases, allergies, cancers, and autoimmune disorders (that is, diseases such as rheumatoid arthritis, in which the immune cells attack the normal tissue of the body). There is no single index of the quality of an individual's immune functioning, or immunocompetence. The immune system is a complex one with many interacting components, and different investigators have chosen to focus on different components of the system. Evidence from a number of areas suggests that stress affects the immune system's ability to defend the body (Schneiderman et al., 2005). One study indicates that the common belief that we are more likely to catch a cold when we are under stress is probably correct (Cohen, Tyrel, & Smith, 1991). Researchers exposed 400 healthy volunteers to a nasal wash containing one of five cold viruses or an innocuous salt solution. The participants answered questions about the number of stressful events they had experienced in the past year, the degree to which they felt able to cope with the demands of daily life, and

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PHYSIOLOGICAL REACTIONS TO STRESS

Psychological stress index	Percentage of virus-exposed people who developed colds
3-4	5
5-6	7
7-8	10
9-10	11
11-12	30

Figure 14.7 Stress and Colds. This graph shows the percentage of virus-exposed people who developed colds as a function of the degree of stress reported. (After S. Cohen, D. A. J. Tyrrell, and A. P. Smith (1991) 'Psychological Stress and Susceptibility to the Common Cold', *The New England Journal of Medicine*, 325: 606-612. Used with permission from S. Cohen.) the frequency with which they experienced negative emotions such as anger and depression. Based on these data, each participant was assigned a stress index ranging from 3 (lowest stress) to 12 (highest stress). The volunteers were examined daily for cold symptoms and for the presence of cold viruses or virus-specific antibodies in their upper respiratory secretions. The majority of the virus-exposed volunteers showed signs of infection, but only about a third actually developed colds. The rates of viral infection and of actual cold symptoms increased in accordance with the reported stress levels. Compared with the lowest-stress group, volunteers who reported the highest stress were significantly more likely to become infected with the cold virus and almost twice as likely to develop a cold (see Figure 14.7). These results held even after controlling statistically for a number of variables that might influence immune functioning, such as age, allergies, cigarette and alcohol use, exercise, and diet. However, the two indicators of immunocompetence that were measured in this study did not show any specific change as a result of stress, so exactly how stress lowered the body's resistance to the cold virus remains to be determined. This study is unusual in that the participants were exposed to a virus, lived in special quarters near the laboratory for a number of days both before and after exposure, and were carefully monitored. Such controlled conditions for studying the effects of stress on health are seldom feasible. Most studies look at individuals undergoing a particularly stressful event - such as academic pressure, bereavement, or marital disruption - and

518 CHAPTER 14 STRESS, HEALTH, AND COPING evaluate their immunocompetence (Delahanty et al., 1998; Schneiderman et al., 2005). For example, a study of people who survived Hurricane Andrew in 1992 found that those who experienced more damage to their homes or whose lives were more threatened by the storm showed poorer immune system functioning than people whose homes and lives had been safer (Ironson et al., 1997). Similarly, following the 1994 Northridge earthquake in the Los Angeles area, people whose lives had been more severely disrupted showed more decline in immune system functioning than those who had not experienced as much stress as a result of the earthquake (Solomon, Segerstrom, Grohr, Kemeny, & Fahey, 1997). People who worried more about the impact of the earthquake on their lives were especially likely to show detriments in natural killer cells, a type of T-cell that seeks out and destroys cells that have been infected with a virus (Segerstrom, Solomon, Kemeny, & Fahey, 1998). It doesn't take a natural disaster to affect people's immune systems. A study of dental students found that dental wounds healed 40 percent more slowly if the wounds were obtained a few days before a stressful exam than if the wounds were obtained during summer vacation (Marucha et al., 1998). The slow healing of wounds during exam period was associated with poorer immune system functioning. One factor that appears to be important is the extent to which an individual can control stress. Recall that controllability is one of the variables that determines the severity of stress. A series of animal studies demonstrated that uncontrollable shock has a much greater effect on the immune system than controllable shock (Laudenslager, Ryan, Drugan, Hyson, & Maier, 1983; Visintainer, Volpicelli, & Seligman, 1982). In these experiments, rats were subjected to electric shock. One group could press a lever to turn off the shock. The other animals received an identical sequence of shocks, but their levers were ineffective (see Figure 14.8). In one study using this procedure, the investigators looked at how readily the rats' T-cells multiplied when challenged by an invader. (T-cells are lymphocytes that secrete chemicals that kill harmful cells, such as cancer cells.) They found that the T-cells from rats that could control the shock multiplied as readily as those from rats that were not stressed at all. T-cells from rats exposed to uncontrollable shock, on the other hand, multiplied only weakly. Thus, shock (stress) interfered with the immune response only in rats that could not control it (Laudenslager et al., 1983). In another study, the investigators implanted tumor cells into rats, gave them shocks, and recorded whether the rats' natural defenses rejected the cells or whether they developed into tumors. Only 27 percent of the rats that were given uncontrollable shocks rejected the tumors, but 63 percent of the rats that could turn the shocks off rejected the tumors - even though the rats received identical amounts of shock (Visintainer et al., 1982). For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

**Operative lever.** The rat can terminate a shock by pressing the lever in front of him.

**Inoperative lever.** Lever presses by the rat have no effect.

**Simultaneous electrical shocks delivered to tails of rats**

**To programmer**

**Figure 14.8**

**Yoked Controls in a Stress Experiment.** A series of electrical shocks are preprogrammed to be delivered simultaneously to the tails of the two male rats. The rat on the left can terminate a shock when it occurs by pressing the lever. The rat on the right has no control in the situation (lever is inoperative), but he is yoked to the first rat. That is, when the first rat receives a shock, the yoked rat simultaneously receives the same shock, and the shock remains on until the first rat presses his lever. The lever presses of the yoked rat have no effect on the shock sequence for either animal.

Perceptions of control also appear to mediate the influence of stress on the immune system in humans. In a study of the effects of marital separation or divorce on immune functioning, the partner who had initiated the separation (the one more in control of the situation) was less distressed, reported better health, and showed better immune system functioning than the other partner (Kiecolt-Glaser et al., 1988). Similarly, studies of women with breast cancer have found that

those with a pessimistic perspective – that is, who felt that they had little control over events – were the most likely to develop new tumors over a five-year period, even after the physical severity of their diseases was taken into account (Levy & Heiden, 1991; Watson et al., 1999). Some of the best evidence that stress can affect the immune system comes from studies showing that at least some types of supportive psychological interventions can slow the progress of cancer (Baum & Posluszny, 1999). For example, several years ago researcher David Spiegel and colleagues began a study in which they randomly assigned women with metastatic breast cancer either to a series of weekly support groups or to no support groups (all of the women were receiving standard medical care for their cancers). The focus of the groups was on facing death and learning to live one's remaining days to the fullest. The researchers had no intention of affecting the course of the cancers and did not believe that it was possible to do so. They wanted only to improve the quality of life for the women in their study. The researchers were quite surprised when, 48 months after the study began, all of the women who had not been in the support groups had died of their cancers whereas a third of the women in the support groups were still alive (Spiegel, Bloom, Kraemer, & Gottheil, 1989). The average survival time (from the time the study began) for the women in the support groups was about 40 months and about 19 months for the women who were not in the support groups. There were no differences between the groups, other than their participation in the weekly support meetings, that could explain the differences in average survival time. The two groups did not differ in the initial seriousness of their cancers, the type of therapy received, or other variables that might have affected their survival time. The researchers were forced to conclude that their intervention actually increased the number of months that the women in the support group lived (for similar results, see Richardson, Shelton, Krailo, & Levine, 1990). How did the intervention affect the progress of these women's cancers? It is not clear, but the women in the support groups gained a great deal of psychological strength from the groups, which were intensely emotional and supportive. Members discussed their fear of dying, visited other members in the hospital, grieved when other members died, attended their funerals, and mourned the loss of abilities and friendships. In addition to sharing grief, the women in these groups derived tremendous strength from one another. They came to feel like experts in living, a wisdom that grew from their confrontation with death. They chose new life projects ranging from imparting values to their children to writing books of poetry (Spiegel, 1991). In addition, group members showed lower levels of emotional distress and learned how to control their physical pain better than women who did not participate in the support groups. Similarly, psychological interventions can substantially influence the time people need to recover from major surgery (see Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002). When people are given information about what to expect before surgery and techniques for reducing pain after surgery, they show faster improvement after surgery, require less pain medication, stay in the hospital a shorter period, and have fewer postoperative complications. The immune system is incredibly complicated, employing several different weapons that interact to defend the body. Much remains to be discovered about the immune system and even more about its relationship to the nervous system. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

## PHYSIOLOGICAL REACTIONS TO STRESS

nervous system. Scientists once believed that the immune system operated quite independently, isolated from other physiological systems. But current studies are making it increasingly evident that the immune system and the nervous system have numerous anatomical and physiological connections. For example, researchers are discovering that lymphocytes have receptors for a number of neurotransmitters and that these immune system cells are equipped to receive messages from the

nervous system that may alter the way they behave. The discovery of a link between neurotransmitters and the immune system is important because negative emotional states such as anxiety or depression can affect neurotransmitter levels. In sum, as research on psychoneuroimmunology yields additional information about the links between the nervous and immune systems, we will gain a clearer understanding of how mental attitudes affect health.

Health-related behaviors As we have already mentioned, certain health-related behaviors can greatly increase our susceptibility to illness. Smoking is one of the leading causes of cardiovascular disease and emphysema. A high-fat diet contributes to many forms of cancer as well as to cardiovascular disease. People who do not regularly engage in a moderate amount of exercise are at increased risk for heart disease and earlier death. Excessive alcohol consumption can lead

©ISTOCKPHOTO.COM/STOCKPHOTO4U Health-related behaviors, such as smoking, are affected by stress.

520 CHAPTER 14 STRESS, HEALTH, AND COPING to liver disease and cardiovascular disease and may contribute to some cancers. And failure to use condoms during sex significantly increases the risk of contracting HIV. Scientists estimate that most of the diseases people die from in industrialized countries are heavily influenced by health-related behaviors (Schneiderman et al., 2005). When we are stressed, we may be less likely to engage in healthy behaviors. Students taking exams stay up all night, often for several nights in a row. They may skip meals and snack on junk food. Many men whose wives have died do not know how to cook for themselves and therefore may eat poorly or hardly at all. In their grief, some bereaved men increase their rates of alcohol consumption and smoking. People under stress cease normal exercise routines and become sedentary. Thus, stress may indirectly affect health by reducing rates of positive health-related behaviors and increasing rates of negative behaviors. Engaging in unhealthy behaviors may also increase a person's subjective sense of stress. Drinking too much alcohol on a regular basis can interfere with cognitive functioning; a person who consumes excessive amounts of alcohol cannot think as clearly or quickly as one who does not drink excessively. Excessive drinking can also induce lethargy, fatigue, and a mild or moderate sense of depression that makes it difficult to overcome stressful situations or just keep up with the demands of everyday life. Similarly, people who do not get enough sleep show impairments in memory, learning, logical reasoning, arithmetic skills, complex verbal processing, and decision making. Sleeping for only five hours per night for just two nights significantly reduces performance on math problems and creative thinking tasks. So, staying up late to prepare for an exam can actually decrease performance on the test (Wolfson, 2002). Among people who already have a serious illness such as cancer or cardiovascular disease, stress can reduce their motivation or ability to engage in behaviors that are critical to their recovery or survival (Schneiderman et al., 2005). For example, they may skip appointments with their physician or fail to take necessary medications. They may not follow diets that are essential for their health; for example, a diabetic may not control sugar intake. Studies of persons infected with HIV disease suggest that those under more stress are more likely to engage in unprotected sexual activity or intravenous drug use (Fishbein et al., 1998). In contrast, people who engage in a healthy lifestyle – eating a low-fat diet, drinking alcohol in moderation, getting enough sleep, and exercising regularly – often report that stressful events seem more manageable and that they feel more in control of their lives. Thus, engaging in healthy behaviors can help reduce the stressfulness of life as well as reducing the risk or progression of a number of serious diseases (Ingledeu & McDonough, 1998). For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

INTERIM SUMMARY | The body reacts to stress with the fight-or-flight

response. The sympathetic nervous system causes increased heart rate, elevated blood pressure, dilated pupils, and the release of extra sugar from the liver. The adrenal-cortical system causes the release of adrenocorticotrophic hormone (ACTH), which stimulates the release of cortisol in the blood. | These reactions are part of a general adaptation syndrome, a set of responses displayed by all organisms in response to stress. The syndrome consists of three phases: alarm, resistance, and exhaustion. | Psychophysiological disorders are physical disorders in which emotions are believed to play a central role. For example, stress can contribute to coronary heart disease. |

Psychoneuroimmunology is the study of how psychological factors can affect the immune system. Stress may impair the functioning of the immune system, increasing the risk of immune-related disorders. | Stress may affect health directly by creating chronic overarousal of the sympathetic division of the autonomic nervous system or the adrenal-cortical system or by impairing the immune system. People under stress also may not engage in positive health-related behaviors, and this may lead to illness. **CRITICAL THINKING QUESTIONS** 1 How can we help people with a serious disease like cancer change in ways that might slow the progress of the disease without making them feel that they are being blamed for having the disease? 2 What are some of your unhealthiest behaviors? What prevents you from changing them? **PSYCHOLOGICAL FACTORS AND STRESS RESPONSES** As noted earlier, events that are uncontrollable or unpredictable, or that challenge our views of ourselves, tend to be experienced as stressful. Some people appear more likely than others to appraise events in these ways. There are three basic theories about why some people are

prone to appraise events as stressful: the psychoanalytic, behavioral, and cognitive theories. **Psychoanalytic theory** Psychoanalysts distinguish between objective anxiety, which is a reasonable response to a harmful situation, and neurotic anxiety, which is anxiety out of proportion to the actual danger. Freud believed that neurotic anxiety stems from unconscious conflicts between unacceptable impulses and the constraints imposed by reality (see Chapter 13). Many impulses pose a threat to the individual because they are contradictory to personal or social values. A woman may not consciously acknowledge that she has strong hostile feelings toward her mother because these feelings conflict with her belief that a child should love her parents. If she acknowledged her true feelings, she would destroy her selfconcept as a loving daughter and risk the loss of her mother's love and support. When she begins to feel angry toward her mother, the resulting anxiety serves as a signal of potential danger. Thus, this woman may experience even a minor conflict with her mother, such as a disagreement about where the family should go for vacation or what to have for dinner, as a major stressor. A woman who is not so conflicted in her feelings about her mother would experience such a conflict as a less severe stressor. According to psychoanalytic theory, we all have unconscious conflicts. For some people, however, these conflicts are more numerous and severe, and as a result these people experience more events as stressful. **Behavioral theory** Although Freud saw unconscious conflicts as the internal source of stress responses, behaviorists have focused on ways in which individuals learn to associate stress responses with certain situations. People may also react to specific situations with fear and anxiety because those situations caused them harm or were stressful in the past. Some phobias develop through such classical conditioning (see Chapter 7). For example, a person whose car nearly slid off the road on the side of a steep mountain may now experience anxiety every time she is in a high place. Or a student who failed a final exam in a particular classroom may feel anxious the next year when he re-enters that room to take another class. Sometimes fears are difficult to extinguish. If your first reaction is to avoid or escape the anxiety-producing situation, you may not be able to determine when the situation is no longer dangerous. A little girl who has been punished for

assertive behavior in the past may never learn that it is acceptable for her to express her wishes in new situations because she never tries. People can continue to have fears about particular situations because they chronically avoid the situation and therefore never challenge their fears. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

### PSYCHOLOGICAL FACTORS AND STRESS RESPONSES

Cognitive theory A wide range of studies show that an attitude of optimism and hope help people respond better psychologically and physiologically to stress, while people who are pessimistic fare badly. In a 35-year study of men in the Harvard classes of 1939–1940, researchers found that men who were pessimistic at age 25 were more likely to develop physical illness over the subsequent years than men with a more optimistic attitude (Peterson, Seligman, & Vaillant, 1988). Other studies have found that pessimists recover more slowly from coronary bypass surgery and have more severe angina than optimists (Scheier et al., 1989; Contrada et al., 2004). One long-term study of older adults showed that an optimistic attitude halved the risk for cardiac events over a ten-year period (Kubzansky et al., 2001). Cancer patients who are optimistic show more positive psychological adjustment and a better course of recovery than those who are pessimistic (e.g., Carver et al., 1993; Carver et al., 2005; Schou et al., 2005). How does pessimism affect health? People who are pessimistic tend to appraise events as more stressful (Lowe, Vedhara, Bennett, Brookes, Gale, Munnoch, Schreiber-Kounine, Fowler, Rayter, Sammon, & Farndon, 2003). In turn, this greater sense of stress may contribute to poor health by causing the chronic arousal of the body's fight-or flight response, resulting in the type of physiological damage discussed earlier. Several studies have found evidence for this. In one, the blood pressure of pessimists and optimists was monitored daily for three days. The pessimists had chronically higher blood pressure levels than the optimists across the three days (Raikkonen et al., 1999). The chronic physiological arousal associated with pessimism has also been linked to lowered immune system functioning. For example, a study of older adults found that those who were pessimistic had poorer immune system functioning than those who were optimistic

© LISA F. YOUNG | [DREAMSTIME.COM](http://DREAMSTIME.COM) Older adults who are optimistic and upbeat may have better immune systems and engage in healthier behaviors.

522 CHAPTER 14 STRESS, HEALTH, AND COPING (Kamen-Siegel, Rodin, & Seligman, 1991). In one study of 412 patients with HIV, those who were pessimistic at a baseline assessment had a greater load of the virus 18 months later than those who were less pessimistic (Milam et al., 2004). Similarly, a study of gay men who were HIV-positive found that those who blamed themselves for negative events showed more decline in immune functioning over 18 months than those who engaged in less self-blaming attributions (Segerstrom, Taylor, Kemeny, Reed, & Visscher, 1996). Another study of gay men found that among both HIV-positive and HIV-negative men, those who were more pessimistic and fatalistic were less likely to engage in healthy behaviors, such as maintaining a proper diet, getting enough sleep, and exercising (Taylor et al., 1992). This is particularly important for the HIV-positive men, because engaging in these behaviors can reduce the risk of developing AIDS. Thus, a pessimistic outlook may affect health directly, by reducing immune system functioning, or indirectly, by reducing a person's tendency to engage in health-promoting behavior.

### Hardiness

Another line of research has focused on people who are most resistant to stress – who do not become physically or emotionally impaired even in the face of major stressful events (Kobasa, 1979; Maddi, 2006). This characteristic is referred to as hardiness. There are three components to hardiness: commitment, control, and challenge. Individuals high in commitment believe it is important to remain involved in events and people, no matter how stressful things become. Individuals high in control retain a belief in their ability to influence

situations even in the face of obstacles. Individuals high in challenge see stresses as a normal part of living, opportunities to learn, develop, and grow in wisdom. In one study, more than 600 men who were executives or managers in the same company were given checklists and asked to describe all of the stressful events and illnesses they had experienced over the previous three years. Two groups were selected for comparison. The first group scored above average on both stressful events and illness; the second group scored equally high on stress but below average on illness. Members of both groups then filled out detailed personality questionnaires. Analysis of the results indicated that the highstress, low-illness men differed from the men who became ill under stress on all three components of hardiness: They were more actively involved in their work and social lives, they were more oriented toward challenge and change, and they felt more in control of events in their lives (Kobasa, 1979). These personality differences could be the result rather than the cause of illness. For example, it is hard for people to be involved in work or in social activity when they are For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) ill. The investigators therefore conducted a longitudinal study that considered the personality characteristics of business executives before they became ill and then monitored their life stress and the extent of their illnesses for two years. The results showed that the executives whose attitudes toward life could be rated high on involvement, feelings of control, and positive responses to change remained healthier over time than men who scored low on these dimensions (Kobasa, Maddi, & Kahn, 1982). The most important factors appear to be a sense of control and commitment to goals (Cohen & Edwards, 1989). Other studies of women (Wiebe & McCallum, 1986) and persons symptomatic with HIV disease (Farber, Schwartz, Schaper, Moonen, & McDaniel, 2000) have also found that hardiness predicts better psychological and physical health. The personalities of stress-resistant or hardy individuals are characterized by commitment, control, and challenge. These characteristics are interrelated with the factors that influence the perceived severity of stressors. For example, the sense of being in control of life events reflects feelings of competence and also influences the appraisal of stressful events. Challenge also involves cognitive evaluation, the belief that change is normal in life and should be viewed as an opportunity for growth rather than as a threat to security. Finding meaning In a related line of work, researchers have been examining a somewhat surprising but heart-warming phenomenon: Many people confronted with a major trauma say that they feel their lives have changed in extremely positive ways as a result of their experiences. Studies of bereaved people, cancer patients, myocardial infarction patients, bone marrow transplant patients, stroke victims and their caregivers, and men testing positive for HIV find that, as a consequence of their experience, they feel their lives have more meaning and they have grown in important ways (for reviews, see Davis & Nolen-Hoeksema, in press; Helgeson, Reynolds, & Tomich, 2006). Take, for example, this quote from a woman who recently lost someone she loved very dearly. I tend to look at it generally as if all the things that happen in my life are a gift, for whatever reason, or however they happen. It doesn't necessarily have to be only pleasant gifts, but everything that happens . . . there's a meaning. I've had a lot of suffering in my life . . . and through that I've learned a great deal. While I wouldn't want to go back and relive that, I'm grateful for it because it makes me who I am. There's a lot of joys and sorrows, but they all enrich life. (Alicia, quoted in Nolen-Hoeksema & Larson, 1999, p. 143)

ª POPA SORIN j DREAMSTIME.COM Finding meaning in a loss can help people cope with it. People often say that they feel they grew in character as a result of their experience, discovering new strengths they didn't know they had. They also say they gained a healthier perspective on what is important in their lives and made major changes in their lives based on this new perspective. Many

people report that their relationships with friends and family members are deeper and more meaningful now. In turn, finding meaning or positive growth in a trauma seems to help people adjust, both physically and psychologically. Several studies have found that people who find meaning or growth in traumatic events show less depression and anxiety after the event than others. For example, in a study of recently bereaved people, Davis and colleagues (1998) showed that those who found some meaning in their loss or felt they grew positively showed less depression and fewer symptoms of post-traumatic stress disorder than those who did not over the 18 months following their loss. It did not matter to psychological health what type of meaning or growth people found, as long as they found some sort of meaning or growth in their experience. Some studies also suggest that finding meaning is related to the course of physiological disease. For example, Affleck and colleagues found that men who had had a heart attack and who felt they had grown personally as a result of the heart attack, such as changing their philosophy of life or values, were less likely to have a subsequent heart attack and had less cardiac disease over the next eight years (Affleck, Tennen, Croog, & Levine, 1987a). In a study of men who were HIV-positive, Bower and colleagues found that those who had found some meaning in the loss of a friend or partner to AIDS maintained healthier immune systems (indexed by CD4 T helper cells) and were less likely to die from AIDS over a two- to three-year follow-up period (Bower, Kemeny, Taylor, & Fahey, 1998). For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

### PSYCHOLOGICAL FACTORS AND STRESS RESPONSES

Why are some people able to find meaning or growth in trauma and others do not? Optimism seems to play a role. Optimists are more likely to report positive changes, benefits, or growth following stressful events (see Helgeson et al., 2006). Similarly, hardy people appear to perceive more benefits from their stressful experiences. For example, a study of U.S. soldiers participating in a peacekeeping mission to Bosnia showed that those who scored high on measures of hardiness during their deployment were more likely to believe they had obtained benefits, such as personal growth, from their work in Bosnia than those who were not hardy (Britt, Adler, & Bartone, 2001).

The type A pattern A behavior pattern or personality style that has received a great deal of attention is the type A pattern. Over the years, physicians had noticed that heart attack victims tend to be hostile, aggressive, impatient individuals who were overinvolved in their work. In the 1950s, two cardiologists defined a set of behaviors that seemed to characterize patients with coronary heart disease, which were labeled the type A pattern (Friedman & Rosenman, 1974). People who exhibit this behavior pattern are extremely competitive and achievement oriented; they have a sense of time urgency, find it difficult to relax, and become impatient and angry when confronted with delays or with people whom they view as incompetent. Although outwardly self-confident, they are prey to constant feelings of selfdoubt, and they push themselves to accomplish more and more in less and less time. Some common type A behaviors are listed in Table 14.2. Type B people do not exhibit the characteristics listed for type A. They are able to relax without feeling guilty and work without becoming agitated. They lack a sense of time urgency, with its accompanying impatience, and are not easily roused to anger. To examine the relationship between type A behavior and coronary heart disease, more than 3,000 healthy, middle-aged men were evaluated by means of a structured interview that was designed to be irritating. The interviewer kept the participant waiting without explanation and then asked a series of questions about being competitive, hostile, and pressed for time, such as 'Do you ever feel rushed or under pressure?' 'Do you eat quickly?' 'Would you describe yourself as ambitious and hard driving or relaxed and easy-going?' and 'Do you resent it if someone is late?' The interviewer interrupted, asked questions in a challenging manner, and made irrelevant remarks. The interview was scored more on the way the person behaved in

answering the questions than on the answers themselves. For example, type A men spoke loudly in an explosive manner, talked over the interviewer

524 CHAPTER 14 STRESS, HEALTH, AND COPING Table 14.2 Type A behaviors Some behaviors that characterize people prone to coronary heart disease. (From Type A Behavior and Your Heart by Meyer Friedman and R. N. Rosenman, copyright © 1974 by Meyer Friedman. Used by permission of Alfred A. Knopf, a division of Random House, Inc.) Thinking of or doing two things at once Scheduling more and more activities into less and less time Failing to notice or be interested in the environment or things of beauty Hurrying the speech of others Becoming unduly irritated when forced to wait in line or when driving behind a car you think is moving too slowly Believing that if you want something done well, you have to do it yourself Gesticulating when you talk Frequent knee jiggling or rapid tapping of your fingers Explosive speech patterns or frequent use of obscenities Making a fetish of always being on time Having difficulty sitting and doing nothing Playing nearly every game to win, even when playing with children Measuring your own and others' success in terms of numbers (number of patients seen, articles written, and so on) Lip clicking, head nodding, fist clenching, table pounding, or sucking in of air when speaking Becoming impatient while watching others do things you think you can do better or faster Rapid blinking or tic-like eyebrow lifting so as not to be interrupted, appeared tense and tightlipped, and described hostile incidents with great emotional intensity. Type B men sat in a relaxed manner, spoke slowly and softly, were easily interrupted, and smiled often. After the participants had been classified as type A or type B, they were studied for eight-and-a-half years. During that period, type A men had twice as many heart attacks or other forms of coronary heart disease as type B men. These results held up even after diet, age, smoking, and other variables were taken into account (Rosenman et al., 1976). Other studies confirmed this twofold risk and linked type A behavior to heart disease in both men and women (see Myrtek, 2007). In addition, type A behavior correlates with severity of coronary artery blockage, as determined at autopsy or in X-ray studies of the inside of coronary blood vessels. Subsequent research refined the concept of type A behavior, finding that a person's level of hostility is a better predictor of heart disease than his or her overall level of type A behavior. Accordingly, several studies have used personality tests rather than interviews to measure hostility. For example, a 25-year study of 118 male lawyers found that those who scored high in hostility on a personality inventory taken in university were five times more likely to die before age 50 than other classmates (Barefoot et al., 1989). In a similar follow-up study of physicians, hostility scores obtained in medical school predicted the incidence of coronary heart disease, as well as mortality from all causes (Barefoot, Williams, & Dahlstrom, 1983). Most recently, a study that followed men for an average of 15 years found that psychological factors including hostility predicted coronary heart disease incidence (Boyle, Michalek, & Suarez, 2006). In these studies, the relationship between hostility and coronary heart disease was independent of the effects of smoking, age, and high blood pressure. How does type A behavior or hostility lead to coronary heart disease? A possible biological mechanism is the way the sympathetic nervous system responds to stress. When exposed to stressful experimental situations (for example, when faced with the threat of failure, harassment, or competitive task demands), most participants report feeling angry, irritated, and tense. However, participants who score high on hostility as a trait show much larger increases in blood pressure, heart rate, and secretion of stress-related hormones than participants with low hostility scores (Raeikkoenen, Matthews, Flory, & Owens, 1999; Suarez, Kuhn, Schanberg, Williams, & Zimmerman, 1998). The same results are found when type A participants are compared with

type B participants. The sympathetic nervous systems of hostile and/or type A individuals appear to be hyperresponsive to stressful situations. All of these physiological changes can damage the heart and blood vessels. Not surprisingly, hostile people also report higher degrees of interpersonal conflict and less social support than other people (e.g., Keltikangas-Javinen & Ravaja, 2002; Williams, in press). Reductions in social support have direct negative effects on a number of objective and subjective indices of health (see Uchino, Uno, & Holt-Lunstad, 1999). Thus, hostility may have both direct effects on cardiovascular health by increasing chronic arousal and indirect effects by lowering social support. The good news about the type A behavior pattern is that it can be modified through well-established therapy programs, and people who are able to reduce their type A behavior show lowered risk of coronary heart disease. We will discuss this therapy later in the chapter.

INTERIM SUMMARY | Psychoanalytic theory suggests that events are stressful when they arouse our unconscious conflicts. | Behaviorists argue that people react to specific situations with fear and anxiety because those situations caused them harm or were stressful in the past. | Cognitive theorists argue that people's level of optimism affects their health. Optimistic people show better immune system functioning and engage in healthier behaviors. | Hardy people tend to see stressful events as challenges and have a strong sense of personal control; these characteristics may protect against the development of illness in the face of stress. | People who are able to find meaning in a traumatic event are less likely to develop emotional problems. | People with the type A behavior pattern tend to be hostile, aggressive, impatient individuals who are overinvolved in their work. Studies of men and women show that people who exhibit this pattern are at increased risk for coronary heart disease. CRITICAL THINKING QUESTIONS 1 What might be the benefits of the type A behavior pattern for people with this pattern? 2 What might make some cultures more prone to stress-related health problems than others?

COPING SKILLS The emotions and physiological arousal created by stressful situations are highly uncomfortable, and this discomfort motivates the individual to do something to alleviate it. The term coping is used to refer to the process by which a person attempts to manage stressful demands, and it takes two major forms. A person can focus on the specific problem or situation that has arisen, trying to find some way of changing it or avoiding it in the future. This is called problem-focused coping. A person can also focus on alleviating the emotions associated with the stressful situation, even if the situation itself cannot be changed. This is called emotion-focused coping (Lazarus & Folkman, 1984). When dealing with a stressful situation, For more Cengage Learning textbooks, visit

[www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) COPING SKILLS most people use both problem-focused and emotion-focused coping. Problem-focused coping There are many strategies for solving problems. First, you must define the problem. Then you can generate alternative solutions and weigh the costs and benefits of the alternatives. Eventually, you must choose between alternative solutions and then act upon your choice. Problem-focused strategies can also be directed inward: You can change something about yourself instead of changing the environment. You can change your goals, find alternative sources of gratification, or learn new skills in inward-directed strategies. How skillfully people employ these strategies depends on their range of experiences and capacity for self-control. Suppose you receive a warning that you are about to fail a course required for graduation. You might confer with the lecturer, devise a work schedule to fulfill the requirements and then follow it, or you might decide that you cannot fulfill the requirements in the time remaining and sign up to retake the course. Both of these actions are problem-focused methods of coping. People who tend to use problem-focused coping in stressful situations show lower levels of

depression both during and after the stressful situation (see Taylor & Stanton, 2007). Of course, people who are less depressed may find it easier to use problem-focused coping. But longitudinal studies show that problem-focused coping leads to shorter periods of depression, even taking into account people's initial levels of depression. In addition, therapies that teach depressed people to use problem-focused coping can be effective in helping them overcome their depression and react more adaptively to stressors (Nezu, Nezu, & Perri, 1989). Other studies have shown that people who use more problem-focused coping had better health following heart surgery (Scheier et al., 2003). Emotion-focused coping People engage in emotion-focused coping to prevent their negative emotions from overwhelming them and making them unable to take action to solve their problems. They also use emotion-focused coping when a problem is uncontrollable (deGroot, Boeke, Bonke, & Passchier, 1997). We try to cope with our negative emotions in many ways. Some researchers have divided these into behavioral strategies and cognitive strategies (see Skinner, Edge, Altman, & Sherwood, 2003). Behavioral strategies include engaging in physical exercise, using alcohol or other drugs, venting anger, and seeking emotional support from friends. Cognitive strategies include temporarily setting the problem aside ('I decided it wasn't worth worrying about') and reducing the threat by changing the

526 CHAPTER 14 STRESS, HEALTH, AND COPING meaning of the situation ('I decided that her friendship wasn't that important to me'). Cognitive strategies often involve reappraising the situation. Obviously, we would expect some behavioral and cognitive strategies to be adaptive and others (such as drinking heavily) to merely cause more stress. One strategy that appears to help people adjust emotionally and physically to a stressor is seeking emotional support from others (Hallaraker, Arefyord, Mavik, & Maeland, 2001; Pakenham, Chiu, Bursnall, & Cannon, 2007). Eisenberg and colleagues (in press) found that people who interacted regularly with supportive friends and relatives showed less neurological and cortisol reactivity to social stressors. Similarly, Taylor et al. (2006) found that young adults who had grown up in supportive families showed less reactivity in certain areas of the brain to emotionally provocative photos, suggesting that their neurological response to social stress was more well modulated. The quality of the social support a person receives after experiencing a trauma strongly influences the impact of that support on the individual's health, however (Taylor, 2007; Warwick, Joseph, Cordle, & Ashworth, 2004). Some friends or relatives can be burdens instead of blessings in times of stress. People whose social networks are characterized by a high level of conflict tend to show poorer physical and emotional health after a major stressor such as bereavement (Windholz, Marmar, & [ISTOCKPHOTO.COM/QUAVONDO NGUYEN](https://www.gettyimages.com/stockphoto.com/quavondo-nguyen) Talking with supportive friends about your problems can be an adaptive coping strategy. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) Horowitz, 1985). Conflicted social relationships may affect physical health through the immune system. Kiecolt-Glaser, Glaser, Cacioppo, and Malarkey (1998) found that newlywed couples who became hostile and negative toward each other while discussing a marital problem showed greater decreases in four indicators of immune system functioning than couples who remained calm and nonhostile in discussing marital problems. Couples who became hostile during these discussions also showed elevated blood pressure for a longer period than those who did not become hostile. Similarly, Taylor et al. (2006) found that young adults who grew up in emotionally unsupportive families showed over-reactivity in key areas of the brain to emotionally provocative photos. Some people engage in a more maladaptive way of coping with negative emotions: They simply deny that they have any negative emotions and push those emotions out of conscious awareness, a strategy that is referred to as avoidant coping. Avoidant coping has been

linked with several health related problems, such as greater pain (Rosenberger et al., 2004) and compromised recovery of function following surgical procedures (Stephens et al., 2002), lower likelihood of remission in depressed patients (Cronkite et al., 1998), lower adherence to medical regimes and subsequently greater viral load in HIV-positive individuals (Weaver et al., 2005), more risky behaviors in HIV-positive injection drug users (Avants et al., 2001), and increased physical symptoms among AIDS caregivers (Billings et al., 2000). Avoidant coping also predicts chronic disease progression and/or mortality people with cancer (EppingJordan et al., 1994), HIV infection (Leserman et al., 2000), congestive heart failure (Murberg et al., 2004), and rheumatoid arthritis (Evers et al., 2003). An intriguing study showed that gay men who conceal their homosexual identity may suffer health consequences (Cole et al., 1996). Men who concealed their homosexuality were about three times more likely to develop cancer and certain infectious disease (pneumonia, bronchitis, sinusitis, tuberculosis) over a five-year period than men who were open about their homosexuality (see Figure 14.9). All of these men were HIV-negative. But another study by the same researchers focused on HIV-positive gay men and found that the disease progressed faster in those who concealed their homosexuality than in those who did not (Cole et al., 1995). The differences in health between the men who were 'out' and those who were 'closeted' did not reflect differences in health-related behaviors (smoking, exercise). It may be that chronic inhibition of one's identity, like chronic inhibition of emotions, can have direct effects on health. In contrast, talking about negative emotions and important issues in one's life appears to have positive effects on health (e.g., Panagopoulou, Maes, Rime, & Montgomery, 2006). In a large series of studies, Pennebaker (2007) has found that encouraging people to reveal personal traumas in diaries or essays improves their health. In one study,

All infectious diseases Sinusitis Bronchitis Pneumonia Tuberculosis 0.5 Incidence (cases per person year) 0.4 0.3 0.2 0.1 Completely out Mostly out Half in and half out Mostly or completely in Degree of concealment Figure 14.9 Infectious Diseases as a Function of Concealing One's Sexual Orientation. Homosexual men who concealed their homosexuality from others were more prone to several infectious diseases. (From S. W. Cole, M. E. Kemeny, S. E. Taylor, and B. R. Visscher (1996), 'Elevated Physical Health Risk Among Gay Men Who Conceal Their Homosexual Identity', *Health Psychology*, 15, pp. 243-251. Copyright © 1996 by the American Psychological Association. Reprinted with permission.) 50 healthy undergraduates were randomly assigned to write either about the most traumatic and upsetting events in their lives or about trivial topics for 20 minutes on four consecutive days. Blood samples were taken from the students on the day before they began writing, on the last day of writing, and six weeks after writing, and it was tested for several markers of immune system functioning. The number of times the students visited the college health center over the six weeks after the writing task was also recorded and compared with the number of health center visits the students had made before the study. As Figure 14.10 shows, students who revealed their personal traumas in essays showed more positive immune system functioning and visited the health center less frequently than students in the control group (Pennebaker, KiecoltGlaser, & Glaser, 1988). In contrast, the group who wrote about trivial events experienced a slight increase in health center visits and a decrease in lymphocyte response, for unknown reasons. Pennebaker (2007) believes that writing is helpful because it assists people in finding meaning in the events that happen to them and helps them understand them. Finding meaning and understanding then reduces the negative emotions people feel about events and may therefore reduce the physiological wear and tear associated with chronic negative emotions. Positive social support may help people adjust better emotionally to stress by leading them to

avoid ruminating about the stressor (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Rumination involves isolating ourselves to think about how bad we feel, worrying about the consequences of the stressful event or our emotional state, or repeatedly talking about how bad things are without taking any action to change them. One longitudinal study of recently bereaved people found that those who ruminated in response to their grief were depressed for longer periods (Nolen-Hoeksema & Larson, 1999). In addition, those who were more socially isolated or had a lot of conflict in their social networks were most likely to ruminate. Another longitudinal study was conducted quite by accident. A group of researchers at Stanford University in California happened to have obtained measures of Trauma Control 5.1 Lymphocyte response 5.0 4.9 4.8 Before writing After writing 0.3 Mean illness visits per month 0.2 0.1 15 Weeks PRIOR to study 6 Weeks DURING study Time period

Figure 14.10 Students' Health After Writing About Traumas or Trivialities. Students who revealed personal traumas in a series of essays had stronger immune system functioning and fewer health care visits than students who wrote about trivial events in their essays. (After Pennebaker, Kiecolt-Glaser, & Glaser, 1988)

528 CHAPTER 14 STRESS, HEALTH, AND COPING CUTTING EDGE RESEARCH Using New Media to Improve People's Health The explosion of new media in recent decades has led to many innovations in the delivery of interventions designed to improve people's emotional and physical health. Technologies such as personal digital assistants (PDAs) and ambulatory heart rate monitors provide opportunities to gather information about people's behaviors (such as diet, exercise, and medication use) and physiology in real time. This information can then be used by physicians to design more personalized interventions for patients that match both the patient's physiological needs and his or her behavioral habits. The Internet is probably the new technology with the greatest impact on health. Millions of people around the world get health information from the Internet every day. The quality of this information varies greatly, however. Physicians are increasingly facing questions or beliefs from their patients that come from misinformation gathered from the Internet. For example, a patient may read about an experimental drug on the Internet and ask his or her physician to prescribe it, but that drug may not be appropriate for the patient, or may not be adequately enough tested that the physician is willing to prescribe it. The Internet can be used to great benefit, however, as a means of delivering high-quality health information and actual interventions to change people's behavior in ways that improve their health. Moreover, Internet-based interventions can be delivered to individuals who might not have access to in-person behavior-change programs, because none are available in their geographic region or because they do not have the means to pay for them. Over half the population of most industrialized countries has access to the Internet, and the majority of Internet users say they get health information off the web (Vandalenotte et al., 2007). Controlled studies of the effectiveness of these interventions give hope that they can be effective in helping people change their behaviors in ways that improve their health. Many Internet-based behavioral interventions aim to increase people's exercise and improve their diets. Regular physical exercise significantly decreases risk for cardiovascular disease, diabetes, and several forms of cancer. Yet, most people do not engage in regular exercise. Similarly, eating fresh fruits and vegetables every day reduces chances of several major illnesses. Yet, the diets of people around the world are increasingly filled with high fat, high sugar, low nutrition foods (Brownell & Horgen, 2004). As a result, rates of obesity are skyrocketing, especially in developed countries. Intensive, in-person programs to get people to increase exercise and to improve their diets work, but are expensive, time-consuming, and simply

not available to many people. The Internet provides the opportunity to deliver exercise and nutrition programs to large segments of the population at a relatively low cost. One such program was initially designed by the multinational corporation General Electric, which sought to improve the health of its workforce. Employees were invited by email to participate in the '5-10-25' program, to increase their physical exercise to 10,000 steps per day or 30 minutes of moderate-intensity physical exercise, to eat five servings of fruits and vegetables per day, and to lose weight if they were significantly overweight. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) <sup>3</sup>[ISTOCKPHOTO.COM/ASISEEIT](http://ISTOCKPHOTO.COM/ASISEEIT) Interventions to improve health behaviors are increasingly being delivered over the internet. Employees who agreed to participate completed an online assessment of their current behaviors and physical needs, and then based on their profile, received regular emails encouraging their progress in the program and e-newsletters with health tips and case studies of employees who had made major behavioral changes. They were given phone and email access to nutrition and fitness coaches who could answer their questions and provide personalized advice. Chat rooms were established for employees to discuss fitness and nutrition with each other. The Weight Watchers program was made available online. The company even created a 'video reality series' that followed two employees who participated in the program. An evaluation of 2,498 employees across 53 nations who participated in the program for about eight months showed that these employees had significant increases in physical activity and the consumption of fruits and vegetables (Pratt et al., 2006). They also lost four to five pounds weight over the period of the program. A review of 15 Internet-based programs designed to improve physical activity and diet found that the majority of programs do result in positive outcomes for participants, compared to control groups (Vandelanotte et al., 2007). The gains tend to be relatively modest, and short-term if the programs are not continued. Across thousands or even millions of people, however, the public health impact of these programs is potentially great. Internet-based programs have been shown to reduce smoking behavior in adults (Japuntich et al., 2006; Munoz et al., 2006) and teens (Woodruff et al., 2007). Recently, the Internet has been used to deliver cognitive-behavioral psychotherapy for depression to adults in developing countries who have no access to psychotherapy, but are given access to the Internet (Christensen, Griffiths, & Jorm, 2004; Munoz, personal communication). Other types of media, such as television shows (novellas) designed to positively influence people's health behavior, are showing effects around the world (Bandura, 2006). It seems that health care professionals are learning to harness the power of new media.

emotion-focused coping tendencies and levels of depression and anxiety in a large group of students two weeks before the major earthquake that hit the San Francisco Bay area in 1989. They re-measured the students' levels of depression and anxiety ten days and seven weeks following the earthquake. They also estimated how much environmental stress the students experienced as a result of the earthquake (that is, injury to themselves, to their friends or family, and to their homes). The results showed that students who exhibited a ruminative style of coping with emotions before the earthquake were more likely to be depressed and anxious ten days after the earthquake and seven weeks later. This was true even after the students' levels of depression and anxiety before the earthquake were taken into account (Nolen-Hoeksema & Morrow, 1991). Students who engaged in dangerous activities, such as drinking alcohol, to avoid their negative moods also tended to remain depressed and anxious. In contrast, students who used pleasant activities to improve their mood and regain a sense of control experienced short and mild periods of depression and anxiety. You might ask whether people who engage in ruminative coping are more likely to

solve their problems. The available evidence suggests that the answer is no. People who engage in ruminative coping are less likely to engage in active problem solving in response to stressors. In contrast, people who use pleasant activities to take a breather from their negative moods are more likely to turn to active problem solving to deal with stressors (Nolen-Hoeksema & Larson, 1999; Nolen-Hoeksema & Morrow, 1991). In addition, people who use ruminative coping may actually do a poorer job of problem solving when they do try. Laboratory studies have shown that depressed people who spend ten minutes ruminating and then do a problem-solving task show poorer performance at problem solving than depressed people who are distracted for ten minutes before attempting the problemsolving task (Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema & Morrow, 1991). Rumination thus may get in the way of good problem solving.

**INTERIM SUMMARY**

Coping strategies are divided into problem-focused strategies and emotion-focused strategies. People who take active steps to solve problems are less likely to experience depression and illness following negative life events. People who use rumination or avoidance strategies to cope with negative emotions show longer and more severe distress after negative events than people who seek social support or reappraise an event to cope with their emotions. For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

**MANAGING STRESS CRITICAL THINKING QUESTIONS**

1 In what way might the environment in which a child is raised affect the development of his or her coping strategies? 2 How might you differentiate between people who repress or deny that they are distressed and people who really do not experience much distress in the face of difficult events?

**MANAGING STRESS**

In addition to seeking positive social support in times of stress, people can learn other techniques to reduce the negative effects of stress on the body and the mind. In this section, we discuss some behavioral and cognitive techniques that have been shown to help people reduce the effects of stress. We then discuss in detail how these techniques are applied to reduce type A behavior and coronary heart disease.

**Behavioral techniques**

Among the behavioral techniques that help people control their physiological responses to stressful situations are biofeedback, relaxation training, meditation, and aerobic exercise.

**Biofeedback**

In biofeedback training, individuals receive information (feedback) about an aspect of their physiological state and then attempt to alter that state. For example, in a procedure for learning to control tension headaches, electrodes are attached to the participant's forehead so that any movement in the forehead muscle can be electronically detected, amplified, and fed back to the person as an auditory signal. The signal, or tone, increases in pitch when the muscle contracts and decreases when it relaxes. By learning to control the pitch of the tone, the individual learns to keep the muscle relaxed. (Relaxation of the forehead muscle usually ensures relaxation of scalp and neck muscles as well.) After four to eight weeks of biofeedback training, the participant learns to recognize the onset of tension and to reduce it without feedback from the machine (Taylor, 1999).

**Relaxation training**

Relaxation training involves teaching people techniques to deeply relax their muscles and slow down and focus their thoughts. Physiological processes that are controlled by

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Blood pressure Heart rate Group 2 (increase) Change in heart rate (beats/min) or blood pressure (mm of mercury) 0 -2 Group 1 (decrease) -4 -6 -8 1 3 5 7 Five-trial blocks

Figure 14.11 Operant Conditioning of Blood Pressure and Heart Rate. Participants in both groups achieved significant simultaneous control of blood pressure and heart rate during a single conditioning session. The group reinforced for lowering both functions (group 1) achieved increasingly greater control over trials; the group reinforced for raising both functions (group 2) was less consistent (G. E. Schwartz (1975) 'Biofeedback, SelfRegulation, and the Patterning of Physiological Processes', in American Scientist, 63:316. Reprinted by permission of

The Scientific Research Society.) the autonomic nervous system, such as heart rate and blood pressure, have traditionally been assumed to be automatic and not under voluntary control. However, laboratory studies have demonstrated that people can learn to modify heart rate and blood pressure (see Figure 14.11). The results of these studies have led to relaxation procedures for treating patients with high blood pressure (hypertension). One procedure is to show patients a graph of their blood pressure while it is being monitored and to teach them techniques for relaxing different muscle groups. Patients are instructed to tense their muscles (for example, to clench a fist or tighten the abdomen), release the tension, and notice the difference in sensation. By starting with the feet and ankle muscles and progressing through the body to the muscles that control the neck and face, patients learn to modify muscular tension. This combination of biofeedback with relaxation training has proved effective in lowering blood pressure for some individuals (Mukhopadhyay & Turner, 1997). Reviews of numerous studies using biofeedback and relaxation training to control headaches and hypertension conclude that the most important variable is learning how to relax (Thorpe & Olson, 1997). Some people may learn to relax faster when they receive biofeedback. Others may learn to relax equally well when they receive training in muscle relaxation without any specific biofeedback. The usefulness of relaxation training seems to depend on the individual. Some people who are not conscientious about taking drugs to relieve high blood pressure are more responsive to relaxation training, whereas others who have learned to control their blood pressure through relaxation may eventually drop the procedure because they find it too timeconsuming. Group two participants received biofeedback (light and tone) whenever their blood pressure and heart rates increased simultaneously. Group one participants received biofeedback (light and tone) whenever their blood pressure and heart rates decreased simultaneously. Exercise Another factor that is important in controlling stress is physical fitness. Individuals who regularly engage in aerobic exercise (any sustained activity that increases heart rate and oxygen consumption, such as jogging, swimming, or cycling) show significantly lower heart rates and blood pressure in response to stressful situations than others (Friedman & Martin, 2007). In turn, physically fit people are less likely to become physically ill following stressful events than people who were not fit. Because of these findings, many stress management programs also emphasize physical fitness. A study of patients with chronic chest pain found that the combination of stress management and exercise training resulted in less frequent periods of angina than either intervention alone (Bundy, Carroll, Wallace, & Nagle, 1998). Cognitive techniques People who are able to control their physiological or emotional responses through biofeedback and relaxation training in the laboratory will have more difficulty doing so in actual stressful situations, particularly if they continue to interact in ways that make them tense. Consequently, an additional approach to stress management focuses on changing the individual's cognitive responses to stressful situations. Cognitive behavior therapy attempts to help people identify the kinds of stressful situations that produce their physiological or emotional symptoms and alter the way they cope with these situations. For example, a man who suffers from tension headaches would be asked to keep a record of their occurrence and rate the severity of each headache and the circumstances in which it occurred. Next he would be taught how to monitor his responses to these stressful events and asked to record his feelings, thoughts, and behavior prior to, during, and following the event. After a period of selfmonitoring, certain relationships often become evident among situational variables (for example, criticism by a supervisor or co-worker), thoughts ('I can't do anything

right'), and emotional, behavioral, and physiological responses (depression, withdrawal, and headache). The next step is trying to identify the expectations or beliefs that might explain the headache reactions (for example, 'I expect to do everything perfectly, so the slightest criticism upsets me' or 'I judge myself harshly, become depressed, and end up with a headache'). The final and most difficult step is trying to change something about the stressful situation, the individual's way of thinking about it, or the individual's behavior. The options might include finding a less stressful job, recognizing that the need to perform perfectly leads to unnecessary anguish over errors, and learning to behave more assertively in interactions instead of withdrawing.

Biofeedback, relaxation training, exercise, and cognitive therapy have all proved useful in helping people control their physiological and emotional responses to stress. Because the complex demands of everyday life often require flexible coping skills, being able to relax may not be an effective method of coping with some of life's stresses. Programs for stress management frequently employ a combination of biofeedback, relaxation training, exercise, and cognitive modification techniques. Modifying type A behavior A combination of cognitive and behavioral techniques has been shown to reduce type A behavior (Friedman et al., 1994). The participants were more than 1,000 individuals who had experienced at least one heart attack. Participants in the treatment group were helped to reduce their sense of time urgency by practicing standing in line (a situation that type A individuals find extremely irritating) and using the opportunity to reflect on things that they do not normally have time to think about, to watch people, or to strike up a conversation with a stranger. Treatment also included helping participants learn to express themselves without exploding at people and to alter certain specific behaviors (such as interrupting others or talking or eating hurriedly). Therapists helped the participants reevaluate certain beliefs (such as the notion that success depends on the quantity of work produced) that might lead to urgent and hostile behavior. Finally, participants found ways to make their home and work environments less stressful (such as reducing the number of unnecessary social engagements). The critical dependent variable in this study was the occurrence of another heart attack. By the end of the study four-and-a-half years later, the experimental group had a heart attack recurrence rate almost half that of For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk)

**MANAGING STRESS** control participants who were not taught how to alter their lifestyles. Clearly, learning to modify type A behavior was beneficial to these participants' health (Friedman et al., 1994). Like other research described in this chapter, this study was based on the premise that the mind and the body influence each other. Simple models of how stress affects health are being replaced by complex models that explain how biological, psychological, and social factors intertwine to create disease or health. As we have seen, the body has characteristic physiological reactions to stress. For people with preexisting biological vulnerabilities, such as a genetic predisposition to heart disease, these physiological reactions to stress can cause deterioration in health. Yet an individual's perception of stress is determined by characteristics of events in the environment and by his or her personal history, appraisals of the event, and coping styles. Thus, the extent to which the individual experiences psychological distress or ill health following potentially stressful situations is determined by the biological and psychological vulnerabilities and strengths he or she brings to these situations.

**INTERIM SUMMARY** | Biofeedback and relaxation training attempt to teach people how to control their physiological responses by learning to recognize tension and reduce it through deep muscle relaxation and concentration. | Exercise can help people cope with stress over the long term. | Cognitive behavior therapy attempts to help people recognize and modify their cognitive and behavioral responses to stress. | Type A behavior can be changed through behavioral and cognitive techniques, resulting in reduced risk of coronary

heart disease. CRITICAL THINKING QUESTIONS 1 Some people claim to be 'addicted to stress'. If this is possible, what might it mean to be addicted to stress? 2 What do you expect would be the greatest challenges to helping a type A person change his or her behavior?

532 CHAPTER 14 STRESS, HEALTH, AND COPING SEEING BOTH SIDES IS UNREALISTIC OPTIMISM GOOD FOR YOUR HEALTH? Unrealistic optimism can be bad for your health Neil D. Weinstein, Rutgers University Are you more likely or less likely to develop a drinking problem than the other people in your psychology class? How about your chances of getting a sexually transmitted disease (STD) or your chances of having a heart attack some day? When asked questions like these, few people admit to having above-average risk. Typically, 50 percent to 70 percent of a group claim that their risk is below average, another 30 percent to 50 percent say that their risk is average, but less than 10 percent acknowledge that their risk is above average. Obviously, this cannot be correct. Your own risk of heart disease might actually be below average, but the number of people who make such a claim is simply too great for them all to be right. The 'average' person has, by definition, an 'average' risk. So when the people who claim below-average risk greatly outnumber those who say their risk is higher than average, something must be wrong with their risk judgments. The data show that most of the individuals whose actions, family history, or environment put them at high risk either don't realize it or won't admit it. In general, we summarize these findings by saying that people are unrealistically optimistic about future risks. This unrealistic optimism is especially strong with risks that are somewhat under our own control, such as alcoholism, lung cancer, and STDs. Apparently, we are quite confident that we will do a better job of avoiding these problems than will our peers. What unrealistic optimism demonstrates is that we are not impartial and open-minded when it comes to health risk information. Most of us want to be informed and make good decisions, but we also want to feel that our lifestyles are already healthful, that changes are not needed, and that we don't have to worry. Unfortunately, this search for a rosy interpretation can For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) get us into trouble. If everything is fine as is, then we don't need to take precautions. We can continue to get drunk with our friends, eat as much junk food as we want, and use condoms only with sexual partners we know are promiscuous (curiously, we rarely think that any of them are). Most of the time, such risky behavior does not get us into trouble, but the odds of getting into trouble are certainly increased. The millions of college students who get STDs every year or who get into automobile accidents after too many beers are clear examples of people doing things that they know are supposed to be risky. But they have concluded that, for them, it will be okay. This is not ignorance; it is unrealistic optimism. An especially upsetting example is college students who smoke cigarettes. They have all kinds of illusions to make them feel comfortable. They will smoke for only a couple of years and then they will quit. (Others may get hooked, but not them.) Their cigarettes are low in tar, or they don't inhale. They exercise a lot, which will counteract the effects of smoking. Smokers don't deny that cigarettes are bad for people. They just think the effects won't be bad for them. Typically, they say that their risk of heart disease, lung cancer, and emphysema is lower than that of other smokers and only 'a little' above the risk of the average person. Optimism does have its advantages. When people already have a severe illness and are coping with it – illnesses such as cancer or AIDS – maintaining optimism is important. It helps people put up with sometimes unpleasant treatments, and a positive mood may itself help by improving the body's ability to resist disease. Even being overly optimistic about the future is unlikely to lead someone who has a life-threatening disease to pretend that he or she is not sick or to stop treatment. However, the perils of unrealistic optimism are greater when the issue is

preventing harm from occurring. If you think you can handle a car after a night of drinking, if none of your dates could carry an STD, or if, unlike your classmates, you can stop smoking any time you want, your unrealistic optimism is likely to lead to health consequences you will regret.

Unrealistic optimism can be good for your health Shelley E. Taylor, University of California, Los Angeles Is unrealistic optimism bad for your health? It seems like it should be. After all, if people believe they are relatively invulnerable to disorders ranging from tooth decay to heart disease, logically, shouldn't that interfere with practicing good health behaviors? Ample evidence suggests that many people are indeed unrealistically optimistic about their health. But, if anything, unrealistic optimism may be good for your health. Consider the practice of health habits, such as wearing a seat belt, getting exercise, and avoiding harmful substances such as tobacco and alcohol. Rather than undermining such habits, as some have assumed, unrealistic optimism may actually lead people to practice better health habits. Aspinwall and Brunhart (1996) found that people with optimistic expectations about their health actually pay more attention to personally relevant risk-related information than pessimistic people, apparently so that they can take preventive action to offset those risks. A study of elderly Dutch men, for example, found that those who were optimistic were more likely to get exercise, be non-smokers, and have a better diet (Giltay, Geleijnse, Zitman, Buijsse, Kromhout, 2007). Perhaps the most persuasive evidence for beneficial health effects of unrealistic optimism has come from studies of people facing major health risks. In one study of men diagnosed with AIDS, maintaining an unrealistically optimistic outlook, as opposed to a realistic one, was associated with a significantly increased length of life (Reed, Kemeny, Taylor, Wang, and Visscher, 1994; see also Ironson et al., 2005). A study of ovarian cancer patients on chemotherapy found that optimism protected against psychological distress and led to a better response to treatment in the form of a decrease in cancer antigen 125 (de Moor et al., 2006). Optimists also seem to recover faster from illnesses. Leedham, Meyerowitz, Muirhead, and Frist (1995) found that optimistic expectations among heart transplant patients were associated with better mood, quality of life, and adjustment to illness. Similar findings are reported by Scheier and his associates (Scheier et al., 1989) in their study of people adjusting to coronary artery bypass surgery. What accounts for findings like these? Optimism is tied to good coping strategies, as well as to good health habits. Optimists are active copers who try to solve problems rather than avoid them (Nes & Segerstrom, 2006). Optimistic people are also more interpersonally successful, and so they may do a better job of attracting social support. Social support is known to reduce the likelihood of illness and promote recovery, and so, optimistic people may recruit this special resource for dealing with stress and with illness (Taylor, 2007). Scientists are also realizing that optimism may create or be associated with a bodily state conducive to health as well as to rapid recovery from illness. Suzanne Segerstrom and her associates (Segerstrom, Taylor, Kemeny, & Fahey, 1998) studied a group of law students under intense academic stress during the first semester of law school. They found that the optimistic law students showed an immunological profile suggestive of greater resistance to illness and infection. Ten years on, the optimistic attorneys were making more money and had better mental and physical health than the less optimistic ones (Segerstrom, 2007). Optimism may forestall health risks due to major stressors as well. That is, when people are going through intensely stressful times, they are often especially vulnerable to illness. But this seems to be less true of optimists. Kivimäki and colleagues (2005) found that optimists who experienced a death or severe illness in their family were less likely to develop health problems

and were faster to recover from illness when they did get sick than were pessimists who experienced these same major stressors. Why do some people think that optimism is bad for your health? Some researchers have indicted unrealistic optimism as a culprit that promotes health risk without the evidence. For example, although smokers seemingly underestimate their risk for lung cancer, there is no evidence that their unrealistic optimism led them to smoke or justifies their continued smoking. Indeed, smokers are well aware that they are more vulnerable to lung disorders than are nonsmokers. Does this mean that unrealistic optimism is always beneficial for your health or is beneficial to all people? Most optimists are 'constructive optimists' who take active efforts to protect their health and safety (Epstein & Meier, 1989). But some optimists are 'naïve optimists' who cling to the belief that everything will turn out all right without any active efforts on their part. For example, among some frightened medical patients, such as cardiac patients, optimism may act to blunt the awareness of the threat to their health and lead to defensive coping, rather than the efficacious problem-focused coping with which optimism is usually tied (Bedi & Brown, 2005). If optimists are ever at risk for poorer health habits, it may be this group of avoidant copers. Before you write off unrealistic optimism as a state that blinds people to the realistic risks we all face, look at its benefits. It keeps people happier, healthier, and more likely to recover from illness. Shelly E. Taylor

534 CHAPTER 14 STRESS, HEALTH, AND COPING CHAPTER SUMMARY Stress refers to experiencing events that are perceived as endangering one's physical or psychological well-being. These events are usually referred to as stressors, and people's reactions to them are termed stress responses. Traumatic events are usually perceived as stressful, as are uncontrollable and unpredictable events. Some researchers believe that any major change, as well as internal conflicts, can be stressful. Some people become angry in response to stress and may become aggressive. Withdrawal, apathy, and depression may result from stress. Some people develop learned helplessness, which is characterized by passivity and inaction and the inability to see opportunities to control one's environment. Some people develop cognitive impairment when stressed and cannot think clearly. The body reacts to stress with the fight-or-flight response. The sympathetic nervous system causes increased heart rate, elevated blood pressure, dilated pupils, and release of extra sugar from the liver. The adrenal-cortical system causes the release of adrenocorticotrophic hormone (ACTH), which stimulates the release of cortisol in the blood. These reactions are part of a general adaptation syndrome, a set of responses displayed by all organisms in response to stress. The syndrome consists of three phases: alarm, resistance, and exhaustion. Stress may affect health directly by creating chronic overarousal of the sympathetic division of the autonomic nervous system or the adrenal-cortical system or by impairing the immune system. People under stress also may not engage in positive healthrelated behaviors, and this may lead to illness. Psychophysiological disorders are physical disorders in which emotions are believed to play a central role. For example, stress can contribute to coronary heart disease. Psychoneuroimmunology is the study of how psychological factors can affect the immune system. Stress may impair the functioning of the immune system, increasing the risk of immune-related disorders. Psychoanalytic theory suggests that events are stressful when they arouse our unconscious For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) conflicts. Behaviorists argue that people react to specific situations with fear and anxiety because those situations caused them harm or were stressful in the past. Cognitive theorists argue that people's levels of optimism affect their health. Optimistic people have better immune systems and engage in healthier behaviors. Hardy people tend to see stressful events as challenges and have a strong

sense of personal control, characteristics that may protect against the development of illness in the face of stress. People who are able to find meaning in a traumatic event are less likely to develop emotional problems. People with the type A behavior pattern tend to be hostile, aggressive, impatient individuals who are overinvolved in their work. Studies of men and women show that people who exhibit this pattern are at increased risk for coronary heart disease. Coping strategies are divided into problem-focused strategies and emotion-focused strategies. People who take active steps to solve problems are less likely to experience depression and illness following negative life events. People who use rumination or avoidance strategies to cope with negative emotions show longer and more severe distress after negative events than people who seek social support or reappraise an event to cope with their emotions. Biofeedback and relaxation training attempt to teach people how to control their physiological responses by learning to recognize tension and reduce it through deep muscle relaxation and concentration. Exercise can help people cope with stress over the long term. Cognitive behavior therapy attempts to help people recognize and modify their cognitive and behavioral responses to stress. Type A behavior can be changed through behavioral and cognitive techniques, resulting in reduced risk of coronary heart disease.

CORE CONCEPTS post-traumatic stress disorder learned helplessness fight-or-flight response general adaptation syndrome psychophysiological disorders coronary heart disease psychoneuroimmunology objective anxiety neurotic anxiety stress stressors stress responses behavioral medicine traumatic events controllability predictability internal conflicts anxiety WEB RESOURCES <http://www.atkinsonhildgard.com/> Take a quiz, try the activities and exercises, and explore web links. <http://wellness.uwsp.edu/Other/stress/> How stressed are you? Answer the questions on this site and find out. [http://www.coolware.com/health/medical\\_reporter/stress.html](http://www.coolware.com/health/medical_reporter/stress.html) Learn more about stress, health, and how to cope with the stress in your life. [http://web2.uwindsor.ca/courses/psychology/fsirois/HP\\_stress\\_links.html](http://web2.uwindsor.ca/courses/psychology/fsirois/HP_stress_links.html) This site provides an extensive range of stress-related links. CD-ROM LINKS Psyk.Trek 3.0 Check out CD Unit 11, Abnormal Behavior and Therapy 11f Types of stress 11g Responding to stress For more Cengage Learning textbooks, visit [www.cengagebrain.co.uk](http://www.cengagebrain.co.uk) CD-ROM LINKS hardiness type A pattern coping problem-focused coping emotion-focused coping biofeedback relaxation training cognitive behavior therapy

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