

7 Stress, Trauma, and Psychopathology

CHAPTER OUTLINE

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LEARNING OBJECTIVES

- 7.1 Explain how stress and trauma are related to health and psychopathology.
- 7.2 Identify the physiological mechanisms involved in stress.
- 7.3 Discuss major findings about fight or flight and social versus physical stress.
- 7.4 Describe the characteristics of PTSD and other DSM-5 stress disorders, causes, and treatment.

As a journalist, I am used to writing about death and destruction. Natural disasters that rip through homes and lives, leaving tattered and torn pieces of towns in their paths. The tsunami, floods in California, earthquakes in Japan. I have become accustomed, even calloused to these horrors as I write about them and survey the video from a distance. I will never do that again. Hurricane Katrina brought all of us down from our ivory towers. It opened our eyes to the frailty of human life, and man-made structures. We are so small compared to Mother Nature.

My TV station sits about four blocks from the beach, just behind the railroad tracks. I guess we thought we were invincible, because no one



Hurricane Katrina struck the Gulf Coast of the United States in 2005, causing many hundreds of deaths and much devastation in the lives of thousands more.

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there evacuated. As the storm got closer I started to get nervous. Not because of the warnings we were giving to the community, or the projections on the Weather Channel, but because I could hear the fear in our own meteorologists' voices. Professionals who have lived through hundreds of storms were shaking.

As Katrina hit land, the wind sounded like the ocean was in pain, and angry. In awe, we stepped out into our courtyard. I watched as the rain that was falling in sideways circles, ripped the roof off of our newsroom. I ran back inside, only to see a hole above my desk and rain pouring onto my computer. In a frantic rush we grabbed equipment, mainly weather computers, and raced to the other, "safer," side of the building.

Pieces of insulation began falling, and metal shards flew past, it felt like a combat zone with enemy fire coming from all directions.

The lights in our studio began pulsating, threatening to become hundred pound projectiles. We rushed to the cinder block section of the building which had been dubbed "hurricane proof" and set up makeshift operations, only to hear a crash above us. A piece of concrete had slammed through the roof and into the second floor. Water began seeping in the front and back doors. Then one of the transmitting towers, weighing hundreds of pounds, collapsed. It looked like a twist tie that had been hastily discarded just inches from where we were huddled. If the storm had been any stronger, or lasted even an hour more, I don't know that we would have made it.

As scary as it was at the station, that wasn't the part that frightened me most. As we were rushing out of our crumbling newsroom the phones were still ringing, with frantic viewers on the other end of the line. The sound of the phone crying made my heart ache. I had talked to dozens of people who were stranded, trapped, and scared just minutes before. I still wonder what happened to the woman who called sobbing, climbing to her attic with her baby. There was a man stuck in his house, trying to punch his way to the roof. One of my coworkers called as she jumped out her bedroom window, and her house was sucked into the murky waters. I can only imagine the horror of seeing a 30 foot wave coming towards you and making what might be your last phone call.

Shilo Groover is a graduate of George Washington University's School of Media and Public Affairs (BA, 2003). She now works as a television producer at WLOX (ABC 13) in Biloxi, Mississippi.

From Shilo Groover. (2005, October 19). The Storm: A First-Hand Account of Katrina [Letter to the editor]. By George! Retrieved from www.gwu.edu/~bygeorge/oct1905/letter.html

I came home from Iraq in March 2004, yet I'm still fighting a war, a war here at home. It's a war of shadows, one that no one seems to really understand. A war of anger and

anxiety, fought in the recesses of my mind. Just like in the two wars I fought in Iraq and Afghanistan, I don't know who the enemy is. There, insurgents take potshots at you, then go back into hiding. Combating post-traumatic stress disorder, PTSD, is the same. Some days I feel as if I have the enemy on the run; other days it has me pinned down.

I am a former military policeman. I was among the first soldiers to move into Afghanistan after the Sept. 11 attacks. For nine months, my company provided support for Rangers and special operations forces. We returned home in September 2002. Four months later, in January 2003, we were in Kuwait preparing for another war.

I remember the day we moved into Iraq. It was about a week after D-Day [the initial U.S.-led invasion in March 2003]. As soon as we crossed the border, we saw cratered highways, dead bodies and burning vehicles. For the next year, my company provided security for main supply routes and patrolled the streets of Mosul. There was never a firefight, just constant, low-level violence. Sniper fire, RPGs, IEDs and mortar attacks kept us on edge at every moment. We were hypervigilant. We couldn't shut it off. It reached the point when we thought that anything could be a bomb, that anything on the road could blow up.

Now, the war is on my home front. I often ask myself, why am I still fighting? I'm safe now, aren't I? But PTSD, like an insurgency, is elusive. It attacks from all angles, almost invisibly. The enemy is out there, but you don't know when or from where an attack will come. As a soldier, I saw things no one ever should. I once responded to a call from a field artillery unit that had shot an Iraqi who tried to flee a checkpoint. Have you ever seen what a .50-caliber round does to a person's head? Imagine a large wooden mallet smashing a watermelon. The .50-cal. does the same. Brain matter was splattered all over the inside of the Iraqi's truck. At the time, I didn't feel anything. I felt numb. It was as if nothing had happened. No emotion at all.

Once I came home, once my mind wasn't racing at 100 miles an hour, I had time to think and to detox from the military. And as I processed my memories, I wondered if something was wrong with me. In truth, my family and my wife knew before I did.

Before I deployed, I was very laid-back, an easygoing guy. I joked around a lot. When I returned from Iraq, I was edgy and short-tempered. The smallest thing could trigger an outburst. I viewed everything from a life-or-death perspective. I would get ticked off if my wife and I left five minutes late for an appointment. On a mission, "five minutes late" can get someone killed. You can't be "five minutes late" to a firefight.

I couldn't get out of The Zone.



Many veterans of the wars in Iraq and Afghanistan suffer from PTSD.
MILpictures by Tom Weber/The Image Bank/Getty Images

In Iraq and Afghanistan, I was constantly telling soldiers what to do to stay alive. I did the same at home. In the evening, when my wife would tell me what she did or where she went that day, I might bark at her. “What the hell’s wrong with you? You could have gotten hurt.”

I couldn’t focus on any one particular task. I had to juggle several jobs at once to relax. That’s why I thrived in the chaos at my workplace, at a job I hated. I had trouble sticking to a conversation, and I had no patience. I couldn’t sit still for more than five or 10 minutes before I had to walk around the house. I couldn’t sit through a movie with my wife unless it was full of action. I played war-based video games to put me in my comfort zone. They soothed me.

At my Vet Center, the staff told me what benefits I was eligible for and walked me through enrollment. They helped me with my job hunt. They gave me their personal phone numbers and told me to call if I needed anything.

And they got me the help I needed. A Vet Center counselor had me tested for traumatic brain injury and PTSD, and got me into group and individual therapy. It’s still a struggle, but I’m taking back control of my life and my feelings. Each day I’m one step closer.

The author deployed to Afghanistan from January to September 2002 and to Iraq from March 2003 to March 2004. He is now studying sociology at a college in Northern California, and plans to pursue a career assisting fellow vets.

From Jeremy P. (2010, February 21). Fighting the War at Home. New America Media. Retrieved from newamericamedia.org/2010/02/fighting-the-war-at-home.php

Psychological Stress and Psychopathology

Psychological stress is experienced when something we do not expect and cannot control happens to us. It can be a building we are in catching on fire. It can be another person robbing us at gunpoint. Stress can even come from trying to help someone but finding ourselves in a situation we did not expect. The stories that begin this chapter show people doing their job when a hurricane hit and confronting the horrors of war and life-and-death decisions. At times, these experiences lead to strong emotional reactions and at other times to psychological disorders such as post-traumatic stress disorder (PTSD). Further, as we saw in the chapter on depression, the first episode of depression is often connected to a psychologically stressful event happening in someone’s life.

Understanding the manner in which stress and trauma are related to health and psychopathology is complicated. Research is beginning to put in place the roles that these factors play in psychopathology. Some disorders have a clear relationship with stress and trauma. PTSD, by definition, is clearly the result of traumatic experiences. Likewise, individuals with depression are 2.5 to 10 times more likely to have experienced a recent, negative, stressful major life event than nondepressive individuals (Slavich et al., 2010).

Further, severe stress and trauma from childhood abuse and neglect are associated with depression, alcohol abuse, and criminal behavior. In disorders such as schizophrenia and bipolar, stress can increase the symptoms.

Overall, early stress is associated with later mental and physical health problems (S. Taylor, 2011; Tost, Champagne, & Meyer-Lindenberg, 2015). One pathway to changes in mental and physical health is that stressful experiences change both psychological and physiological reactions to future stressful experiences. These changes can be related to psychological factors, developmental changes in the brain, genetic factors, epigenetic modifications, endocrine factors, and economic and social factors.

Does Trauma Produce Mental Illness?

Trauma can produce psychological disorders, especially PTSD. However, although various types of trauma show a relationship to psychopathology, this relationship is not found for every individual (Nikulina, Widom, & Brzustowicz, 2012). What researchers have articulated is that children show differential responses to environmental influences, such as maltreatment, which are modulated by genetic factors. Specifically, the monoamine oxidase A (MAOA) gene located on the X chromosome makes certain neurotransmitters inactive and has been associated with aggression in mice and humans. This gene encodes the brain enzyme MAO-A and makes such neurotransmitters as serotonin, norepinephrine, and dopamine inactive.

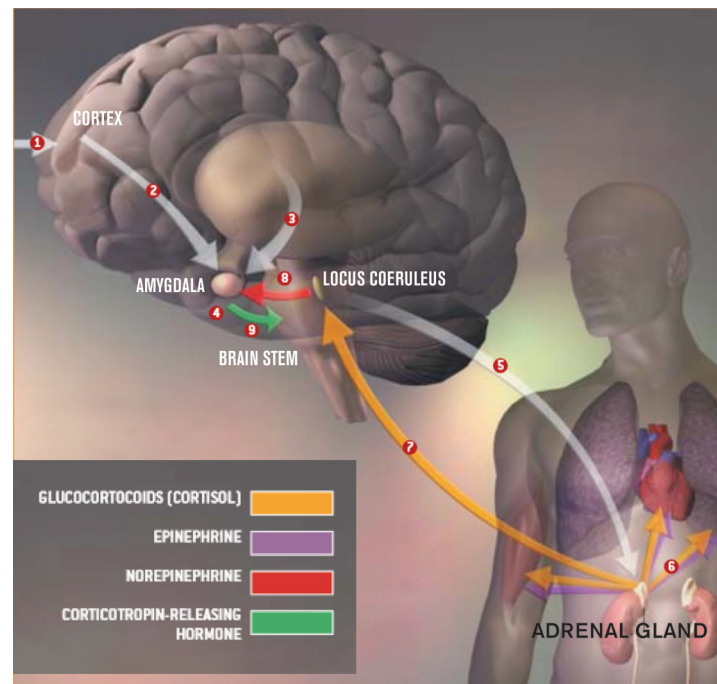
Following a large number of boys over a long term, Caspi and his colleagues (2002) found that mistreatment as a child influenced some boys differently from others later in adulthood. Those boys who were mistreated in childhood and had a particular form of the MAOA gene were more likely to be violent and engage in a variety of antisocial behaviors as adults, as well as have problems with law enforcement officials. Those without this particular form of the gene did not display antisocial behaviors, even if they had been mistreated as children. Thus, environmental influences in terms of maltreatment would be modulated by the presence of certain genetic structures.

Research from a different perspective supports the idea that children show differential effects to not only negative but also positive parental influences. Jay Belsky (2005) has reviewed a variety of these studies. What he determined is that the infants who are most inhibited and fearful and who display negative emotions are the ones most affected by positive parenting. Thus, positive interventions can also influence later outcomes for the better.

■ FIGURE 7.1 How Does Stress Influence Your Body?

Stress pathways involve different regions of the brain and body organs in various feedback loops. With a perceived threat (1), a signal is sent to the amygdala by both conscious (2) and preconscious (3) pathways. Corticotropin-releasing hormone (CRH) is released (4) and stimulates the ANS (5). The adrenal glands produce epinephrine and with a different pathway, glucocorticoids. This begins the fight-or-flight response (6). Continued stress induces the locus coeruleus (7) to release norepinephrine that goes to the amygdala (8) leading to more CRH (9).

Source: Sapolsky (2003, p. 89).





What happens when faced with a potential threat? According to Walter Cannon (1932), the body prepares you either to fight or to leave the scene.

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The Physiological Mechanisms Related to Stress and Trauma

Our physiological reactions to stress and trauma occur on a variety of levels. These include chemical tagging of the reaction of the **immune system**, the endocrine system involving the **hypothalamic–pituitary–adrenal (HPA) axis**, the **autonomic nervous system (ANS)**, and changes in cortical processes (see *Figure 7.1*).

What Makes You Run From Bears? Stress and the Hypothalamic–Pituitary–Adrenal Axis

The evolutionary logic of survival is one of the easiest to comprehend. If an organism is not able to successfully respond to threat, it can be hurt or killed. If it is killed, its genes can no longer be passed on. If it is hurt, this may make it a less appealing mate or not allow it to seek mates. Thus, it is expected that organisms will have evolved sophisticated mechanisms that benefit survival. The basic mechanisms include the ANS; a network of hypothalamic, pituitary, and adrenal responses; the cardiovascular system; metabolism; and the immune system. These mechanisms are particularly sensitive to changes in the environment, and repeated stressful events can modify their functioning.

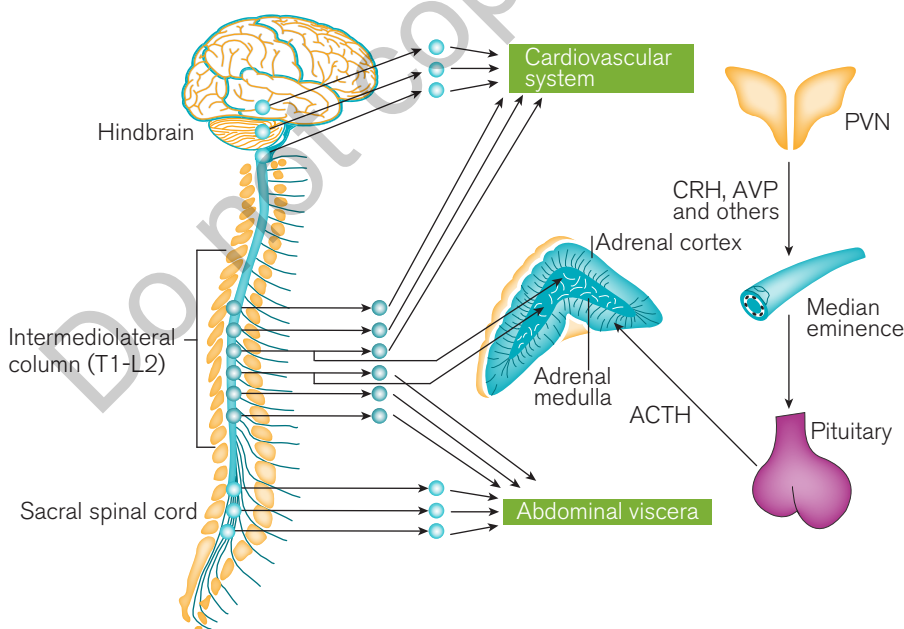
The basic function of these pathways is to prepare the body for action. If you see a bear, you will need energy to run. It actually does not need to be a bear. Almost all stressors use the same physiological systems to save your life. These pathways move physiological energy resources

to the necessary organs and muscles. They create an overall shift from storing energy to using energy. This is like pressing on the accelerator of your car to quickly leave a dangerous situation. Temporally, priorities of the body move from a flexibility, including past and future considerations, to focus on immediate circumstances. Your body no longer stores energy, pays attention to sexual matters, or has your immune system worry about long-term disease. Cognitively and emotionally, threat-relevant cues and memories become critical as they relate to the current situation. As you know, your brain plays an important role in deciding what is stressful, whether it is taking an exam or responding to a loud noise. The brain has two major pathways with which it influences peripheral physiology.

FIGURE 7.2 The HPA Pathway Involved in Physiological Responses to Psychological Stress

In response to stress, the *autonomic nervous system (ANS)* innervates a variety of organs including the adrenal medulla, which results in the release of catecholamines. The HPA axis and sympathetic system have largely complementary actions throughout the body, including energy mobilization and maintenance of blood pressure during stress.

Source: Ulrich-Lai & Herman (2009).



The first pathway is the *autonomic nervous system*, which innervates a variety of organs including the adrenal medulla, resulting in the release of catecholamines (norepinephrine and epinephrine) from the terminal of sympathetic nerves (see *Figure 7.2*). Norepinephrine and epinephrine are fast acting, so you are ready to respond within seconds. It can be noted that if these substances are released at the synapse, they are referred to as neurotransmitters. If they are released into the bloodstream, they are referred to as hormones.

The second pathway involves cells in the hypothalamus that are released into the bloodstream and go to the pituitary gland. This causes the pituitary to release hormones that influence other hormones, which in turn influence peripheral organs such as the adrenals as well as cells in the immune system. These hormones are referred to as glucocorticoids. Simply said, this system helps to convert stored fats and carbohydrates into energy sources that can be used immediately. Historically, given that survival processes that would have activated this system would have involved conflict and fights, it was important that the immune system also be activated to protect the organism from wounds. This protective pathway is known as the **hypothalamic–pituitary–adrenal (HPA) axis**. In psychology and physiology, these mechanisms have been studied under the rubric of psychological stress. Further, underactivity or overactivity in the HPA axis is seen in a number of psychopathologies including schizophrenia, autism, and depression (Roggers, Morgan, Bronson, Revello, & Bale, 2013).

The stress response is accomplished by a variety of interacting brain systems, which include the amygdala, hippocampus, and prefrontal cortex (see *Figure 7.3*). It is these areas that show distinct structural and functional changes in those individuals with stress disorders (Chattarji, Tomar, Suvrathan, & Ghosh, 2015). In particular, the prefrontal cortex and hippocampus show a reduction in volume and activity in stress. The amygdala shows an increase in activity. These brain areas regulate both short-term and long-term responses to stress (Hariri & Holmes, 2015; McEwen et al., 2015), and these responses result in the hypothalamus activating the sympathetic nervous system and the HPA axis.

Basically, the hypothalamus in the brain produces a substance referred to as *corticotropin-releasing hormone (CRH)* (also called corticotropin-releasing factor [CRF]), which then produces *adrenocorticotrophic hormone (ACTH)* in the pituitary. ACTH in the blood results in the adrenal glands producing glucocorticoids, which in turn increases blood sugar levels and thus increases the energy available to our bodies during stress (see *Figure 7.3*). HPA is under excitatory control of the amygdala and inhibitory control of the hippocampus. The hippocampus releases CRF, which is transported to the adrenal cortex where *cortisol* is released.

Research studies will often take a measure of participants' cortisol levels to assess the perceived stressfulness of the situation. Daily cortisol levels are also higher in individuals with depression. Further, variants in the gene related to CRH can influence the individual's reactivity to stress. Research suggests that this variation influences brain processes before childhood trauma takes place and leaves the individual at risk for greater negative effects from childhood trauma (J. Rogers et al., 2013). Stress can actually influence brain processes by reducing the connections of one neuron with another, especially in the hippocampus and the frontal areas of the brain (Sapolsky, 2015). Stress shows the opposite effect in the amygdala with the increase of

■ FIGURE 7.3 The Glucocorticoids Pathway Involved in Stress

Another stress pathway involves cells in the hypothalamus that are released into the bloodstream and go to the pituitary gland. This causes the pituitary to release hormones that influence other hormones, known as glucocorticoids. This system helps to convert stored fats and carbohydrates into energy sources that can be used immediately.

Source: From McEwen, B. S., Bowles, N. P., Gray, J. D., Hill, M. N., Hunter, R. G., Karatsoreos, I. N., & Nasca, C. (2015). Mechanisms of stress in the brain. *Nature Neuroscience*, 18(10), 1353–1363.

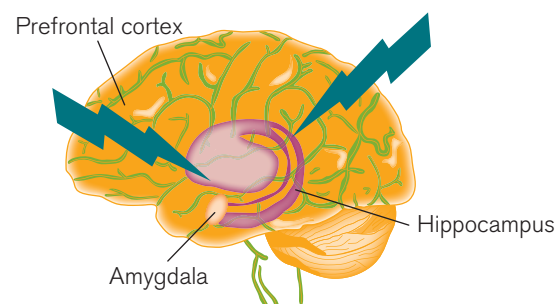
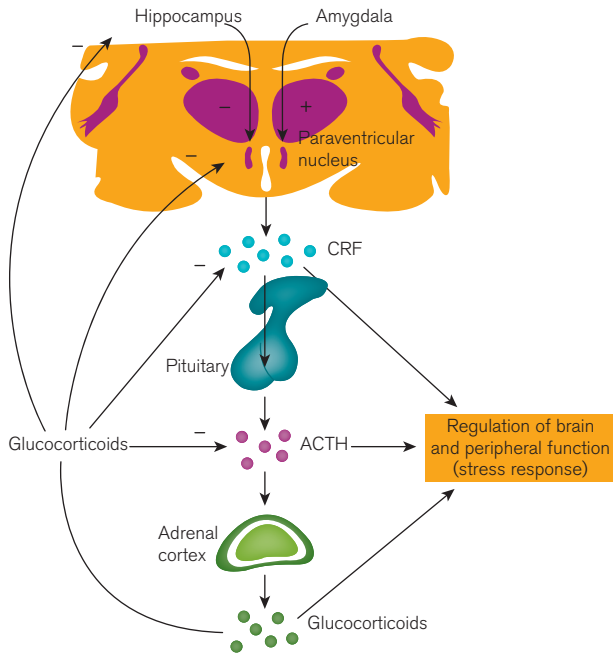


FIGURE 7.4 Which Brain Structures Influence the HPA?

The hypothalamic–pituitary–adrenal axis is under excitatory control of the amygdala and inhibitory control of the hippocampus.

Source: Hyman (2009).



ACTH. Short-term stress also suppresses the immune system and makes energy available. With depression, the mechanisms involved in the HPA axis are disrupted and the normal stress response is not present.

The HPA axis has also been associated with the development of psychosis in adolescence (E. Walker, McMillan, & Mittal, 2005). E. Walker and colleagues noted that four lines of research exist showing that HPA dysregulation is involved in the vulnerability to psychosis. First, behavioral studies have shown that clinical symptoms can be exacerbated by exposure to stress. Second, medical disorders such as Cushing's, which involves elevated levels of cortisol, are associated with increased risk for psychosis. Third, unmedicated patients with psychosis show abnormalities in the HPA axis and a positive correlation between cortisol levels and symptoms. Fourth and finally, the hippocampus, which plays a role in regulating the HPA axis, is shown to be smaller in patients with psychosis. Reduced hippocampal volume is seen early in the development of psychosis.

The Autonomic Nervous System

The function of the autonomic nervous system (ANS) is threefold. The first task is to maintain homeostatic conditions within the body. This keeps the processing of internal functions, such as heart rate and blood pressure, in balance. The second task is to coordinate the body's response to exercise and stress, which is the function that will be emphasized in this chapter. The third task involves helping the endocrine system regulate reproduction.

The ANS is generally discussed in terms of the **sympathetic division** and the **parasympathetic division**. As can be seen in *Figure 7.5*, the sympathetic division connects with its target organs through the middle part of the spinal cord. The sympathetic division is responsible

neuron connections. This in turn leaves the person with more connections when responding to fearful situations.

The stress response was initially described by Walter Cannon in 1932 as a bodily response to danger. Although Cannon originally studied animals, research since his time has shown the basic stress response also applies to humans. The overall stress reaction has been referred to as the **fight-or-flight response** (W. Cannon, 1932). What happens when faced with a potential threat? According to Cannon, the body prepares you either to fight or to leave the scene. It has also been noted that some animals also “freeze” or “play dead” when faced with an attack. Cannon's work emphasized the sympathetic nervous system and the role of epinephrine and norepinephrine in the stress response.

The stress response is accomplished by a variety of interacting systems that include the amygdala and other cortical systems, which results in the hypothalamus activating the sympathetic nervous system and the HPA axis. In general, stress reduces our ability to think and plan while increasing our emotional responses.

In terms of psychopathology, the HPA axis has been linked to anxiety and depression (Lamers et al., 2013). HPA axis overactivity has been seen in individuals with more severe forms of depression. As shown in *Figure 7.4*, the response to short-term stress results in the production of cortisol and the secretion of CRF and

for the fight-or-flight response. This emergency response produces resources for the body to energize. As such, its connections are *adren-ergic*, as they produce the adrenaline reaction of energizing the body. In general, the sympathetic system produces a continuous influence on the organ it innervates. This is referred to as sympathetic tone.

The parasympathetic system, on the other hand, is involved in the restoration of bodily reserves and the elimination of bodily waste. It connects through the upper and lower parts of the spinal cord. As such, its connections are *cholinergic*, which involves acetylcholine. These reactions are generally a reduction of activity and a process of bringing the body back to a state of *homeostasis*. It should be noted that although the sympathetic and parasympathetic systems are often seen to function in an opposite manner, the actual relationship between the two is much more complicated (Berntson, Cacioppo, & Quigley, 1991, 1993).

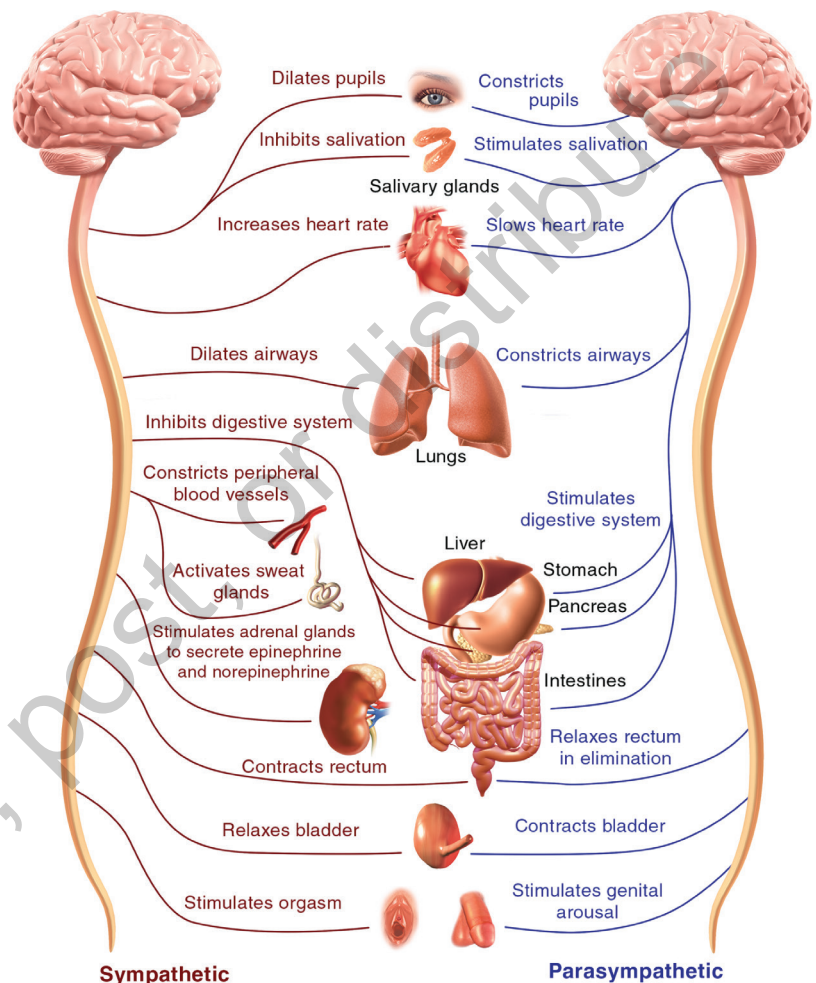
What we have seen thus far are the various systems that have evolved to help the body manage changes within the environment. Humans make predictions about what to expect. When we see something we did not expect such as a bear in the woods, our body through these systems prepares us to protect ourselves by leaving the situation or staying and fighting. If the unexpected continues to occur, we experience it as psychological stress. This can result in negative reactions in these systems that can lead to psychological disorders. The next section will describe some of the ways that psychological stress has been studied and move the discussion to the level of the person.

Psychological Stress and the Immune System

Imagine that you are ending your first year in medical school, and it is time to take a series of final exams. Clearly, this is a stressor for most students. How do you think taking exams will affect your immune system and your experience of psychological distress? To answer this question, Janice Kiecolt-Glaser and her colleagues (1984) took blood samples from students and performed psychological inventories a month before the exams and on the day of the exams. What they found was that compared with the previous month, the immune system was more suppressed on the day of the exam. This is consistent with the finding that students often get sick or have mouth or lip sores at the end of the term. They also found

■ **FIGURE 7.5** How Do the Sympathetic and Parasympathetic Aspects of the ANS Influence Our Body?

The sympathetic and parasympathetic branches of the autonomic nervous system (ANS) influence internal organs in complementary ways.



that the students reported more anxiety, depression, and bodily concerns on the day of the exam. Overall, this suggests that even relatively mild stress in the form of exams can change immune function and cause psychological distress. Since this classic study was performed, we have learned much more about the immune system.

The immune system evolved to help organisms protect themselves from pathogens. These protective mechanisms involved in immune function appear to be some of the earliest to have evolved. Basic reflexes such as sneezing, coughing, and crying are additional mechanisms for removing pathogens before they can enter the body. If pathogens do enter the body, then there are a number of layers of immune function to deal with them.

One important task of the immune system is to determine what is foreign and what cells are part of the self. Foreign substances include bacteria, viruses, and parasites that enter our bodies and are detected by the immune system. Antibodies that are produced by our immune system can detect literally millions of different foreign substances and engage in a process that hopefully leads to their destruction. Our immune system has evolved to recognize a variety of pathogens. It is also capable of learning the characteristics of new pathogens and attacking them upon later exposure. This, of course, is the basic mechanism through which immunizations work.

The immune system comes into play both in terms of specific pathogens such as viruses and also in terms of stress. At one time, the immune system was viewed as a separate system that functioned independently. However, since the 1970s, a variety of studies have demonstrated that the immune system is influenced by the brain and vice versa. In particular, it has been shown that psychological stress can influence the immune system such that the organism is more likely to become ill. Robert Ader (2007) was also able to show that the immune system could be classically conditioned. These types of studies helped to create the field of *psychoneuroimmunology* (Kemeny & Schedlowski, 2007).

Psychoneuroimmunology is the study of how psychological factors can influence the immune system. One meta-analysis of more than 300 studies showed that stress in the form of loss or trauma suppresses the immune system (Segerstrom & Miller, 2004). Current research suggests that negative emotions can change immune responses and delay healing (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002). Some of the psychological factors that can influence the immune system include loneliness, poor social support, negative mood, disruption of marital relationships, bereavement, and natural disasters (S. Cohen & Herbert, 1996). Factors such as close friendships, which reduce negative emotions, enhance immune system functioning (Kiecolt-Glaser, Gouin, & Hantsoo, 2010). It has also become apparent that not only does experience influence the immune system, but the immune system can also influence the brain and thus behavior.

A relatively recent finding is that the immune system can be involved in mental illness. We all know that infections can leave us feeling sick and experiencing low energy levels. One type of cell involved in this process is a protein called a cytokine. What is striking to some scientists is that the symptoms associated with sickness and those associated with depression are similar. With both sickness and depression, the person withdraws from interactions with others and does not actively seek new experiences. These individuals also do not respond to positive experiences or rewards.

There is now evidence that cytokines can also lead certain individuals to develop depression (Dantzer, 2012; Dantzer et al., 2008). What makes this relationship complicated is that in some studies, the inflammation precedes depression, whereas in others, the opposite is the case. That is, individuals with clinical depression show inflammatory biomarkers in their bloodstream. Other studies have shown that immune cells in the brains of individuals with autism are more active, resulting in increased inflammation (Pardo, Vargas, & Zimmerman, 2005). Inflammation has also been associated with schizophrenia (Khandaker et al., 2015). Clearly, researchers who study psychopathology now must also consider the immune system. Current research is indeed beginning to focus on stress, the immune system, and psychopathology.

Trauma Changes Our Genes Through Tagging (Epigenetics)

Let's briefly review the nature of epigenetics as related to stress. Instead of actually changing the gene itself, epigenetic modifications tag a gene. This alters how the gene is turned on and off. As you may recall from Chapter 2, deoxyribonucleic acid (DNA) is wrapped around clusters of proteins called histones. These are further bundled into structures called chromosomes. Being tightly packed keeps genes in an inactive state by preventing access to processes that turn genes on. When action is needed, a section of DNA unfurls and the gene turns on. Whether a segment is relaxed and able to be activated or condensed, which results in no action, is influenced by epigenetic marks. As a tag, histone acetylation tends to promote gene activity and is called a *writer*. Histone methylation and DNA methylation tend to inhibit it and are called *erasers*.

The environment can influence these writer and eraser tags. Tags help an organism respond to a changing environment. Some tags last a short time, whereas others can last a lifetime. In one study introduced previously (G. Miller, 2010; Weaver et al., 2004), researchers observed that some rat mothers display high levels of nurturing behavior, licking and grooming their pups, whereas others are less diligent. Behaviorally, the offspring of the more active mothers were less anxious and produced less stress hormone when disturbed than pups cared for by more passive mothers. Further, the females raised by nurturing mothers became nurturing mothers themselves.

In terms of stress, those pups raised by less nurturing mothers became more sensitive to stress throughout their lives. When confined to a Plexiglas tube, which restricted their movement, they produced more of the stress hormone cortisol. If the mouse mother lacks access to basic needs, then she shows difficulty making nests and spends less time with the young (Roth & Sweatt, 2011). This, in turn, is related to the methylation of the genes, which is passed on to the next generation. Other research found that mice raised by multiple mothers, which is the norm for mice in the wild, show better social adjustment as adults. These mothers also spend more time with their own pups, and this shows an association with oxytocin receptors (Curley, Davidson, Bateson, & Champagne, 2009).

Although less epigenetic research has been performed with humans, there are suggestions that similar mechanisms may be at work in terms of human stress. In one of the first studies to examine the effects on offspring of intimate partner violence during pregnancy, Radtke and associates (2011) found changes in epigenetic factors. Examining human mothers and their children some 10 to 19 years after birth, DNA methylation of the gene associated with the stress hormone cortisol was seen in the children whose mothers had experienced partner violence during pregnancy. Children whose mothers did not experience partner violence or those whose mothers experienced partner violence before or after pregnancy did not show the effect. Overall, this suggests that mothers' experiences during pregnancy can have long-term epigenetic effects on their children. Although the epigenetic mechanisms were previously unknown, a number of earlier studies showed that children of mothers who experienced psychological stress during pregnancy were more likely to experience anxiety and depression in their life (Huizink, Mulder, & Buitelaar, 2004).

Another study examined the brains of individuals who had committed suicide (McGowan et al., 2009).



Like other species, affection in humans may lead to less stress in adulthood.
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These researchers were interested in the question of whether the brains of those who had been abused differed in epigenetic factors from those who had not. What they found was that those individuals who had experienced childhood abuse showed more methyl groups on the stress gene receptor involved with cortisol. This was not the case with individuals who committed suicide but were not abused or a control group who did not commit suicide. Overall, initial evidence suggests that childhood abuse can have a long-term epigenetic effect. This illustrates the manner in which action on one level—in this case, the behavioral level—can result in changes in other levels such as the molecular one.

A variety of recent studies have considered the possibility that epigenetic changes such as DNA methylation and histone modification are involved in mental illness (Iwamoto & Kato, 2009). At this point, the strongest evidence for epigenetic mechanisms relates to schizophrenia and bipolar disorder, although the mental disorder research suggests anxiety and depression can also be related. However, there is still much research to be performed to describe the pathways from psychological stress to psychopathology (Albert, 2010).

Is Social Pain Like Physical Pain?

Over evolutionary time, our physiological and psychological systems have evolved to protect us in a variety of situations as well as to offer mechanisms for sexual and social encounters. One of the most important of these protections is the pain system, which alerts individuals to tissue or nerve damage or times in which our physiological systems are not functioning normally. Muscle pains and headaches are clear examples of these situations.

What about social pain? Rejection and loss of loved ones, for example, involve some of the most painful experiences for humans. What is interesting is that over evolutionary time, the processing of social pain appears to have co-opted the basic brain structures involved in physical pain (Eisenberger & Lieberman, 2004; Panksepp, 1998). Linguistically, to refer to emotional pain we use some of the same phrases as with physical pain. We say we have a broken heart or that our feelings are hurt. The impetus for a system to detect and prevent social separation would have developed in childhood to keep the infant close to his or her mother.

Pain research suggests that there are two separate components to the experience of pain. The first is the sensory experience itself, and the second is the felt unpleasantness (D. D. Price, 2000). The sensory experience involves the somatosensory cortex and the posterior insula. The experienced unpleasantness is associated with the anterior cingulate cortex (ACC). It is the second system that appears to be altered in psychopathology and is most sensitive to psychological factors.

Research has shown that in both physical and social pain, the ACC plays a critical role (Eisenberger & Lieberman, 2004). An intact ACC is required for young animals to emit distress sounds when separated from their caregivers. It is also the case that an intact ACC is required for caregivers to show affiliative behaviors. With humans, playing a video game in which the person felt exclusion was associated with ACC activity. Further, the magnitude of the ACC activity correlated with the self-report of social distress. Those with borderline personality disorder, as will be described in Chapter 14, experience this rejection more acutely than other individuals. Additional evidence for the relationship between physical pain and social pain is that an increase in one type of pain also produces an increased sensitivity to the other type of pain. Comforting experiences such as social support will also reduce sensitivity to physical pain. This has implications for the treatment of psychological disorders.

CONCEPT CHECK

- What evidence can you cite to show that stress experienced early in life is associated with later mental and physical health problems?
- Although various types of trauma show a relationship to psychopathology, what factors can affect that relationship?

- Our physiological reactions to stress and trauma occur on a variety of levels. What are five important levels?
- Describe an example of how trauma can lead to epigenetic changes.
- In what respects is social pain like physical pain?

The Study of Stress

One of the major figures in stress research was the Hungarian endocrinologist Hans Selye, who worked at the University of Montreal. It was actually Selye who coined the term *stress* in 1936, borrowing the word from physics. In physics, stress refers to the strain placed on a material. Selye used the term as a way of organizing physiological responses to a variety of challenges including heat, cold, pain, noise, hard work, and so forth. One of Selye's early findings was that the body reacts similarly to a variety of these different stressors. Selye called this response the **general adaptation syndrome (GAS)**. The GAS was seen to involve three stages. The first was the alarm stage. This was an initial reaction to the stress that involved an increase in adrenal activity as well as sympathetic nervous system reactions such as increased heart rate. The second stage was the resistance stage. This stage represents an adjustment to the stress that includes the availability of additional energy resources and mechanisms for fighting infection and tissue damage. The third stage was the exhaustion stage in which bodily resources are depleted. One of the paradoxes that Selye recognized was that the physiological stress responses that protect and restore the body can also damage it. However, Selye also reported that repeated exposure to a particular stress situation could also increase the organism's ability to withstand that same stress in greater amounts.

More recently, Bruce McEwen has begun to address the paradoxical nature of the stress response (McEwen, 2010; McEwen et al., 2015). He began by suggesting part of the problem in understanding stress is the ambiguous meaning of the term *stress*. He suggested that the term be replaced with *allostasis*. **Allostasis** refers to the body's ability to achieve stability through change. That is, the brain perceives and adapts to stressful situations. In doing so, the brain determines what is threatening, remembers these situations, and produces stress reactions. This can be either physical or social stress. Brain processes can achieve stability in a number of different ways. A complex set of interactions in our bodies occurs in response to stress, which uses the autonomic nervous system, cortisol, our metabolic system, and our immune system to attempt to achieve stability.

Allostatic systems are thus systems designed to adapt to change. Change traditionally related to stress for humans takes on a broad range of possibilities, including dangerous situations, being in crowded and unpleasant environments, getting an infection, and performing in front of others. Some researchers even suggest that stress may be greater for humans than other animals, since we are also able to use our cognitive abilities to increase the experience of stress through imagination.

The overall stress response involves two tasks for the body. The first is to turn on the allostatic response that initiates a complex adaptive pathway. Some examples of this are the *fight-or-flight response* and the *tend-and-befriend response*, which will be described shortly. Once the danger has passed, the second task needs to be initiated—turning off these responses. A variety of research suggests that prolonged exposure to stress may not allow these two mechanisms to function correctly and in turn leads to a variety of physiological problems. This cumulative wear and tear on the body by responding to stressful conditions is called **allostatic load**.

Allostatic load has been discussed by McEwen (1998) in terms of four particular situations. The first situation reflects the fact that allostatic load can be increased by frequent exposure to stressors. These stressors can be both physical and psychological in nature. A variety of psychological studies have shown an association between worry, daily hassles, and

negative health outcomes. One of the most studied areas is cardiovascular risk factors, with stress showing a strong association with heart attacks and the development of atherosclerosis.

The second condition for the increase in allostatic load is where an individual does not adapt or habituate to the repeated occurrence of a particular stressor. Some people, for example, continue to show major physiological responses to everyday situations like driving a long distance or taking an airline flight, even though the data suggest there is limited risk in these situations. Asking individuals to talk before a group also induces stress-like responses in many individuals.

The third situation reflects the fact that not all individuals respond the same to changing situations. In particular, some individuals show a slower return to a non-challenge physiological condition once the initial threat is removed. These individuals appear to be more at risk for developing health-related conditions. Some researchers suggest that high blood pressure is associated with a normal stress response not being turned off.

The fourth and final condition discussed by McEwen reflects the situation in which a nonresponse to stress produces an overreaction in another system. That is, if one system does not respond adequately to stress, then activation of another system would be required to provide the necessary counterregulation and return the system to homeostasis. Overall, McEwen emphasized the important question of individual differences and the variety of ways in which perceived stress can influence future health (McEwen, 2013; McEwen et al., 2015). His graphic depiction of the allostatic system is seen in *Figure 7.6*.

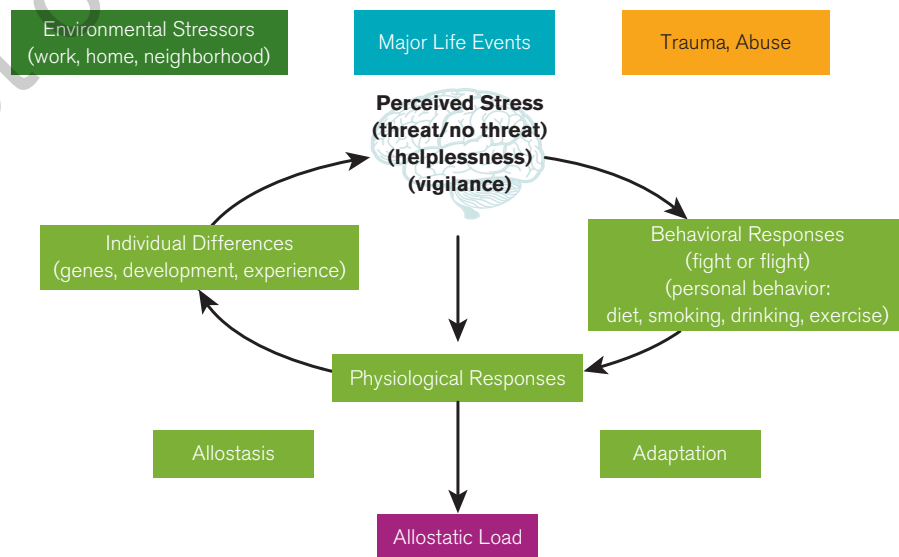
Does Fight or Flight Apply Equally to Males and Females?

The fight-or-flight response is seen as a critical mechanism for responding to stress. The problem for current-day humans is that many of the stressors we face do not require a fighting or fleeing response. For example, imagine that you are working in a large company where there are rumors that a number of people are being laid off. Your boss calls you into the office. Your initial response is probably to feel stress, as you could be the next to be fired. As you go in, you can feel your heart pounding. At this point, your boss says, “You have been doing a great job, and I want to ask your opinion on another project.” The threat is gone, but your

FIGURE 7.6 How Is the Human Brain Involved in Experiencing Stress?

The brain interprets experience and determines what is threatening and therefore stressful.

Source: Bruce McEwen, The Rockefeller University Laboratory of Neuroendocrinology.



body is still reacting. This fight-or-flight reaction has been critical throughout our evolutionary history, but today, in our different social structure, it may lead to stress-related disorders.

In many ways, males and females have had different evolutionary pressures on them, influencing the manner in which they respond to various challenges. After examining a variety of studies, Shelley Taylor and her colleagues (2000) suggested that the fight-or-flight response better describes a human male's response to stress rather than a female's. For females, they suggested a better descriptor is the **tend-and-befriend response**. What did they mean by this? First, they noted that, over evolutionary time, females have evolved behaviors that maximize the survival of both themselves and their offspring. Second, when stressed, females respond by nurturing offspring as well as displaying behaviors that protect them from harm. These tending behaviors have also been shown to reduce the presence of stress hormones in infants. Third, like fight or flight, these behaviors are associated with particular neuroendocrine responses, although different hormones are involved. These responses make up the *tending response*. The tending response activated by stress is seen as part of the larger attachment process. The *befriending response* involves a large social group. Females under stress seek contact with their social group, which is also protective in survival terms.

What is intriguing is that the basic neuroendocrine responses to stress appear to be similar in both males and females (S. E. Taylor, Dickerson, & Klein, 2002). It is initially a sympathetic response, as described previously. However, what is different is that these hormones affect males and females differently. Human males show the sympathetic response of activation and increased arousal, which can lead to aggression—the fight part of fight or flight. The male brain appears to be organized to give aggressive responses in the presence of substances such as testosterone that are less present in the female brain. What is present in the female brain is the hormone *oxytocin*, which is released in larger amounts in females compared with males. Oxytocin has been found in a variety of animal studies to reduce anxiety and calm the organism. According to Shelly Taylor and her colleagues, oxytocin leads females to quiet and calm down offspring in response to stress. Thus, whereas males are seen to produce more sympathetic-like responses to stress, females show more parasympathetic-like responses. Oxytocin is seen to lie at the basis of these responses for females—the tend-and-befriend response.

Additional support for the presence of gender differences in response to stress has come from the work of Repetti (1989). She examined the behaviors of fathers and mothers following a stressful workday. Whereas fathers tended to isolate themselves at home following stress, mothers tended to be more nurturing and caring toward their children. Further, similar differences also are found in the larger social networks where stressed females tend to seek out other women for comfort and support. Compared with females, males seek support from same-sex friends less often. A variety of anthropological studies suggest that males and females form groups for different purposes. Male groups tend to be larger and directed at well-defined tasks such as defense. Female groups tend to be smaller and carry with them social and emotional connections to a greater degree.

Why did researchers initially not see differences in male and female responses to stress? The answer is simple. During most of the twentieth century, females were not studied in this research. Even the animal studies typically used males. Once females were studied more intensely, these differences emerged. If you think about it, you can see that these stress response differences are consistent with mating differences and investment in the care of offspring. That is to say, given that the female typically



Females under stress seek contact with their social group, which is also protective in survival terms.

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has a greater role in caring for offspring, her response to stress should not jeopardize herself or her offspring as might be the case with fleeing or fighting.

What we now know is that gender differences in the stress response can be found at all stages of life (Bale & Epperson, 2015). During pregnancy, males in the womb are at greater risk for maternal and environmental stress. During childhood, negative events increase the risk in women for later affective disorders such as anxiety and depression. Different experiences of stress are also seen in females in different phases of their menstrual cycle. In aging, women also show greater cortisol responses to stress-related stimuli than men. However, after menopause, the rate of affective disorders is similar for males and females.

What is less well known is that stressful events activate the same immune and brain circuits as do infections (Watkins & Maier, 2002). Why is this so? What Watkins and Maier suggested is that the immune system first evolved to be sensitive to pathogens, such as those associated with disease or the common cold. In evolutionary time, the immune system is seen to have evolved before such responses as fight or flight, since all organisms have mechanisms for dealing with pathogens.

Does Social Stress Produce a Similar Reaction to Physical Stress?

Not only does our stress system respond when we are faced with threatening situations from our environment, but it also responds to challenges in our social world (Flinn, 2008). Just being asked to stand up and talk in front of a group of people will produce characteristic stress responses along with the experience of anxiety. Given the social nature of human beings, it is not unreasonable to assume threats to our social system would be important.

However, the evolutionary link that connects social challenges with the stress system for life-and-death situations is less well understood. One would assume that as with many other evolutionary processes, nature used systems already available. Flinn (2008) reviews the idea that the adaptive value of the social stress response begins in childhood. A number of studies across a variety of species have shown that early exposure to stress will modify how the stress response is expressed in later life. It appears that children who experience trauma in the form of abuse, or a death of a parent, or divorce show larger stress responses to social stress later in life. Depression is one disorder whose presence can be increased by these prior experiences. PTSD and dissociative disorders result from a more direct pathway with psychological stress and trauma. It is not the case, however, that early physical stress such as experiencing hurricanes or political upheaval in one's country results in a differential stress response. In the next section, stress-related disorders will be described.

CONCEPT CHECK

- There is evidence that the immune system is influenced by the brain and vice versa. What is an example where the brain influences the immune system? What is an example where the immune system influences the brain?
- What are the two pathways of the stress response that we have evolved to save us from threats such as bears? What are some of the effects of the stress response for psychopathology?
- What are the functions and structure of the ANS?
- According to McEwen, the overall stress response involves two tasks for the body. What are they? What are the impacts of prolonged stress on these mechanisms?
- How is the tend-and-befriend response different from the fight-or-flight response?
- Does social stress produce a similar reaction to physical stress? What factors would you cite in support of your answer?

Trauma- and Stressor-Related Disorders in *DSM-5*

There are several disorders in *DSM-5* that result from the experience of stress. The three most significant of these are **adjustment disorders**, **acute stress disorder**, and **post-traumatic stress disorder (PTSD)**. The severity of the stressor is the least in adjustment disorder and the greatest in PTSD. In fact, an adjustment disorder does not require the experience of a traumatic event but only an event experienced as distressing. An acute stress disorder was originally conceived as a shorter-term reaction to stress, and the stress may be non-traumatic in nature. In PTSD, symptoms must exist for more than a month, whereas an adjustment disorder or acute stress disorder can be diagnosed immediately following a distressing experience. An adjustment disorder does not require specific symptoms but more global distress within 3 months after a stressful event. The requirement for an adjustment disorder is that the reaction to the event is out of proportion to the severity of the stressor. Acute stress disorder and PTSD do require specific symptoms.

Although the stress-related disorders other than PTSD have not been studied extensively in terms of treatment, there is data to suggest that psychotherapy presented early can reduce the development of PTSD (Bryant, Friedman, Spiegel, Ursano, & Strain, 2011). One difficult question is how to distinguish a normal stress reaction from an acute stress disorder. It should be noted that a stress reaction should be treated only in those asking for treatment. In studies looking at trauma, requiring workers to be part of a treatment session actually made matters worse (Ehlers & Clark, 2003). This suggests that when the treatment begins after the trauma is important.

Adjustment Disorders

Everyone reacts when things do not go as expected, like the loss of a job, a breakup with a boyfriend or girlfriend, or losing money in a business relationship. Natural disasters such as a tree falling on your house or your basement flooding from strong rains create an emotional reaction. Emotional reactions can also be more long term, such as living in a difficult neighborhood or living with a physical disability. These are examples that are upsetting. However, when the reactions to such events are out of proportion to the severity of the event, it can be considered an adjustment disorder. The reaction to the event may also interfere with social functioning and job performance. A diagnosis of adjustment disorder requires that the reaction to the stressful event happen within 3 months of the occurrence of the stressful event and that the reaction not last for longer than 6 months.

Although formal epidemiological studies for adjustment disorders are rarer than for other disorders such as anxiety or depression, these disorders are thought to be common within the mental health system. They are estimated to represent up to 20% of those seeking mental health treatment and about 7.1% for inpatients (R. Jones, Yates, & Zhou, 2002). Rates of these disorders are slightly higher in females than males (approximately 60% to 40%). Adjustment disorders are fairly prevalent, but there is little research concerning empirically supported therapies. In general, the same treatments used for anxiety as well as PTSD are used with adjustment disorders. These include both psychosocial therapy and anti-anxiety medications. These will be described in more depth in the section concerning PTSD in this chapter and in Chapter 8, which focuses on anxiety.

Acute Stress Disorder

Acute stress disorder is a short-term reaction to traumatic events that lasts from 3 days to 1 month. If the clinical symptoms continue past this period, the disorder would be described as PTSD. Like PTSD, the trauma can include events such as war experiences; physical attack;



Heavy rains can flood streets in an unexpected manner, causing stress and potentially leading to trauma.

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muggings; terrorist attacks; torture; physical and sexual abuse; transportation accidents; and natural disasters such as hurricanes, fires, and earthquakes. Acute stress disorder can also occur from watching traumatic events happen to another person.

Clinical symptoms following the trauma are described in terms of five categories. The first category is intrusion and can include such symptoms as involuntary distressing memories, distressing dreams, and flashbacks. The second category is negative mood and includes the inability to experience happiness. The third category is dissociative symptoms such as feeling in a fog or the inability to remember important aspects of the trauma. The fourth category is avoidance symptoms. These symptoms include avoiding situations, people, and places that remind one of the trauma. The fifth category is arousal symptoms. These include sleep disturbance, angry outbursts, showing extreme vigilance, problems with concentration, and a sensitivity to events that cause

a startle. A given individual may show symptoms in a limited number or all of these five categories. These specific symptoms are shown in *Table 7.1*.

TABLE 7.1 *DSM-5* Diagnostic Criteria for Acute Stress Disorder

- A. Exposure to actual or threatened: death, serious injury, or sexual violation in one (or more) of the following ways:
1. Directly experiencing the traumatic event(s).
 2. Witnessing, in person, the event(s) as it occurred to others.
 3. Learning that the event(s) occurred to a close family member or close friend. Note: In cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental.
 4. Experiencing repeated or extreme exposure to aversive details of the traumatic event(s) (e.g., first responders collecting human remains, police officers repeatedly exposed to details of child abuse).
- B. Presence of nine (or more) of the following symptoms in any of the five categories of intrusion, negative mood, dissociation, avoidance, and arousal, beginning or worsening after the traumatic events occurred:

Intrusion Symptoms

1. Recurrent, involuntary, and intrusive distressing memories of the traumatic event(s). Note: In children, repetitive play may occur in which themes or aspects of the traumatic event(s) are expressed.
2. Recurrent distressing dreams in which the content and/or affect of the dream are related to the event(s). Note: In children, there may be frightening dreams without recognizable content.
3. Dissociative reactions (e.g., flashbacks) in which the individual feels or acts as if the traumatic event(s) were recurring. Such reactions may occur on a continuum, with the most extreme expression being a complete loss of awareness of present surroundings. Note: In children, trauma-specific reenactment may occur in play.
4. Intense or prolonged psychological distress or marked physiological reactions in response to internal or external cues that symbolize or resemble an aspect of the traumatic event(s).

Negative Mood

5. Persistent inability to experience positive emotions (e.g., inability to experience happiness, satisfaction, or loving feelings).

Dissociative Symptoms

6. An altered sense of the reality of one's surroundings or oneself (e.g., seeing oneself from another's perspective, being in a daze, time slowing).

7. Inability to remember an important aspect of the traumatic event(s) (typically due to dissociative amnesia, and not to other factors such as head injury, alcohol, or drugs).

Avoidance Symptoms

8. Efforts to avoid distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s).
9. Efforts to avoid external reminders (people, places, conversations, activities, objects, situations) that arouse distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s).

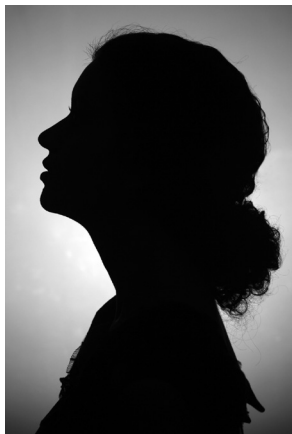
Arousal Symptoms

10. Sleep disturbance (e.g., difficulty falling or staying asleep, or restless sleep).
 11. Irritable behavior and angry outbursts (with little or no provocation), typically expressed as verbal or physical aggression toward people or objects.
 12. Hypervigilance.
 13. Problems with concentration.
 14. Exaggerated startle response.
- C. Duration of the disturbance (symptoms in Criteria B) is 3 days to 1 month after trauma exposure.
- Note: Symptoms typically begin immediately after the trauma, but persistence for at least 3 days and up to a month is needed to meet disorder criteria.
- D. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- E. The disturbance is not attributable to the physiological effects of a substance (e.g., medication or alcohol) or another medical condition (e.g., mild traumatic brain injury) and is not better explained by brief psychotic disorder.

Source: Reprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (Copyright 2013). American Psychiatric Association.

The prevalence of acute stress disorder varies in terms of type of trauma (APA, 2013). Highest rates (20%–50%) are seen when the traumatic event involves being assaulted, being raped, or witnessing a mass shooting. Other prevalence rates are lower for those events that do not involve interpersonal assault. These include being part of a motor vehicle accident (13%–21%), being burned severely (10%), being part of an assault (19%), and being involved in industrial accidents (6%–12%). Overall, the prevalence is higher for females than males. On an individual level, a number of factors, including negative appraisals of the trauma, high trait anxiety, showing signs of depression, suicide risk, and not being married or employed, have been associated with greater severity of acute stress symptoms. However, when these are considered using regression analysis, only high trait anxiety, suicide risk, and trauma appraisal significantly predicted severity of symptoms (Suliman, Troeman, Stein, & Seedat, 2013).

The acute stress disorder diagnosis was introduced in *DSM-IV*. This diagnosis helped to identify individuals who showed stress reactions in a short time after the trauma. It was also seen as a set of criteria that would help to identify those who go on to develop PTSD. Changes were made in the *DSM-5* criteria for acute stress disorder, and these have been shown to identify those who will later develop PTSD (Bryant et al., 2015). As you will see in *LENS: Does Debriefing Help Prevent PTSD?* one important line of research has involved the search for ways in which to prevent PTSD from developing in those who experience stress and trauma.



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Post-Traumatic Stress Disorder

I am a middle-aged woman, married with two children. I was diagnosed with post-traumatic stress disorder (PTSD) at age 25. I am grateful to say that I have had tremendous support, terrific professional help, a strong will to recover, and a resolve to do whatever work necessary to overcome all of my trauma. Other miraculous help has been my spiritual beliefs and practices.

As a child I suffered numerous traumatic events that began when I was just two years old. I was physically abused, sexually abused, emotionally abused, and spiritually abused. I was terrorized, tortured, neglected, and abandoned. Unfortunately, there were multiple perpetrators; that has made the healing and confusion about what pieces of the puzzle fit together tiresome at times.

The good news is that it's gotten better! One tremendous step in the right direction was putting myself in therapy at age 21 years. Another was quitting drinking alcohol with the help of Alcoholics Anonymous [AA]. I abused alcohol to escape reality. I am grateful to say I have been sober for almost two decades.

It was just after my first AA anniversary that I began having persistent, terrifying flashbacks that came in many forms, including flashes of images in my mind (like a movie, only skipping some parts), body memories, and loss of time due to dissociation. I admitted myself into a psychiatric hospital, and the journey to recovery began. It was while there I was diagnosed with PTSD.

I'd like to say I no longer suffer from flashbacks, but even at the time of this writing, I am in the middle of recovering another memory from my childhood. This has become routine after all these years, but unfortunately it does include horrible flashbacks—and that is the frustrating part. I have learned they won't kill me or make my head explode, which is something I used to believe.

*From K. Waheed. (n.d.). Honoring the Person I Am.
Retrieved from the Anxiety and Depression Association of America website,
www.adaa.org/living-with-anxiety/personal-stories/honoring-person-i-am*

Since at least the American Civil War, there have been studies of long-term health problems related to combat (B. Levy & Sidel, 2009). It seems that each war has created a new name for what we now call PTSD. In World War I, “shell shock” was a commonly used term. As the name implies, it was thought that the exploding shells caused a psychological and physical reaction including the feeling of helplessness. During World War II and the Korean War, more psychological terms such as neuroasthenia, psychoneurosis, and “battle fatigue” were used. During the Vietnam War, many in American society ascribed the previously described “battle fatigue” to drug abuse or a stress response. There was political debate over whether PTSD even existed and whether Vietnam soldiers should be treated in government centers for a somewhat vague condition (C. Hoge, Riviere, Wilk, Herrell, & Weathers, 2014). However, a growing acknowledgment of the reality of the disorder led to the first definition of PTSD. The current symptoms in *DSM-5* are shown in *Table 7.2*.

CAUSES, CHARACTERISTICS, AND PREVALENCE OF PTSD

PTSD results from an experienced threat that produces intense fear, helplessness, or horror (M. Friedman, Keane, & Resick, 2014; Shalev, Liberzon, & Marmar, 2017; Vermetten &

LENS

Does Debriefing Help Prevent PTSD?

Our common sense tells us that the quicker we can intervene with someone who experienced trauma, the better the results will be. After the terrorist attacks on the World Trade Center on September 11, 2001, more than 9,000 counselors went to New York City (McNally, Bryant, & Ehlers, 2003). These mental health professionals assumed that those who experienced the attack, including rescue workers, would be at high risk for developing PTSD. Although sites for this help were set up around the city, few people actually sought the help. In fact, around 650,000 individuals sought help, whereas they expected to treat 2.5 million. Some professionals said that New Yorkers were in denial. Others said that there would be a delayed reaction and PTSD would come later. One survey followed up on a sample of New Yorkers at 1 month, 4 months, and 6 months following 9/11 (Galea et al., 2003). This study found the relative prevalence of PTSD to be 7.5% at 1 month, 1.7% at 4 months, and .06% at 6 months. This suggests a rapid recovery in terms of PTSD following 9/11. Other studies have also shown a steep decline in PTSD symptoms after a traumatic event or serving in a war zone around a year later (North et al., 1999).

This raised the question of whether psychological interventions directed at everyone following a traumatic event were necessary. Since

the 1980s, one common form of intervention was a *critical incident stress debriefing* (Mitchell, 1983). It was initially introduced as a single-session technique to help rescue workers and has since been used throughout the world. The basic procedure was to discuss the rescue worker's psychological, cognitive, and emotional reactions to the event. This session was conducted within a few days of the exposure. Although well received by most workers, the overall evidence suggests that it is not effective in reducing future PTSD (Rose, Bisson, Churchill, & Wessely, 2002). Thus, many international organizations such as the Red Cross no longer require debriefing for all workers. However, they offer services for those who seek them.

The current approach is to offer information and coping skills to those rescue workers who seek help. The emphasis is on helping the person to cope rather than reexperience the situation. However, services are offered to those who show signs of trauma-related disorders. Those in distress are treated by professional mental health workers. We will explore their experience in the treatment section of this chapter.

Thought Question: What services are offered at your college for students who have experienced trauma?

Lanius, 2012). In addition to war, these experiences can involve family and social violence, rape and assaults, forest fires, and accidents (see *Table 7.3*). The highest risk for PTSD is assaultive violence. Cumulative stress also can lead to PTSD. Whereas acute stress disorder is a short-term reaction to trauma, PTSD is present when the reaction lasts more than 1 month.

It has been estimated that 60% of all men and 50% of all women will experience a serious threat to their life or that of another close to them during their lifetime. Of these, 8.7% will develop PTSD during their lifetime. Twelve-month prevalence is 3.5% in the United States (APA, 2013). The occurrence of PTSD is twice as common in women as men. Females also experience PTSD for a longer period than males. Although PTSD is found in a variety of cultures, its prevalence is higher in the United States than it is in Europe, Asia, Africa, and Latin America. In these cultures, it is estimated to be around 1%, although New Zealand shows a rate of 6.1% (WHO, 2005). In addition, *DSM-5* reflects the possibility that PTSD can develop in childhood, as illustrated by the first-person account at the beginning of this section.

TABLE 7.2 *DSM-5* Diagnostic Criteria for Post-Traumatic Stress Disorder

- A. Exposure to actual or threatened death, serious injury, or sexual violence in one of the following ways:
1. Directly experiencing the traumatic event(s).
 2. Witnessing, in person, the event(s) as it occurred to others.
 3. Learning that traumatic event(s) occurred to a close family member or close friend. In cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental.
 4. Experiencing repeated or extreme exposure to aversive details of the traumatic event(s) (e.g., first responders collecting human remains; police officers repeatedly exposed to details of child abuse).
- Note: Criterion A4 does not apply to exposure through electronic media, television, movies, or pictures, unless this exposure is work related.
- B. Presence of one (or more) of the following intrusion symptoms associated with the traumatic event(s), beginning after the traumatic event(s) occurred.
1. Recurrent, involuntary, and intrusive distressing memories of the traumatic event(s).
- Note: In children older than 6 years, repetitive play may occur in which themes or aspects of the traumatic event(s) are expressed.
2. Recurrent distressing dreams in which the content and/or affect of the dream are related to the event(s). Note: In children, there may be frightening dreams without recognizable content.
 3. Dissociative reactions (e.g., flashbacks) in which the individual feels or acts as if the traumatic event(s) were recurring. (Such reactions may occur on a continuum, with the most extreme expression being a complete loss of awareness of present surroundings.)
- Note: In children, trauma-specific reenactment may occur in play.
4. Intense or prolonged psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event(s).
 5. Marked physiological reactions to internal or external cues that symbolize or resemble an aspect of the traumatic event(s).
- C. Persistent avoidance of stimuli associated with the traumatic event(s), beginning after the traumatic event(s) occurred, as evidenced by one or both of the following:
1. Avoidance of or efforts to avoid distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s).
 2. Avoidance of or efforts to avoid external reminders (people, places, conversations, activities, objects, situations) that arouse distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s).
- D. Negative alterations in cognitions and mood associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two or more of the following:
1. Inability to remember an important aspect of the traumatic event(s) (typically due to dissociative amnesia and not to other factors such as head injury, alcohol, or drugs).
 2. Persistent and exaggerated negative expectations about oneself, others, or the world (e.g., "I am bad," "No one can be trusted," "My whole nervous system is permanently ruined," "The world is completely dangerous").
 3. Persistent distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others.
 4. Pervasive negative emotional state (e.g., fear, horror, anger, guilt, or shame).
 5. Markedly diminished interest or participation in significant activities.
 6. Feelings of detachment or estrangement from others.
 7. Persistent inability to experience positive emotions (e.g., inability to experience happiness, satisfaction, or loving feelings).

- E. Marked alterations in arousal and reactivity associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following:
1. Irritable behavior and angry outburst (with little or no provocation) typically expressed as verbal or physical aggression toward people or objects.
 2. Reckless or self-destructive behavior.
 3. Hypervigilance.
 4. Exaggerated startle response.
 5. Problems with concentration.
 6. Sleep disturbance (e.g., difficulty falling or staying asleep, or restless sleep).
- F. Duration of the disturbance (Criteria B, C, D, and E) is more than 1 month.
- G. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- H. The disturbance is not due to the physiological effects of a substance (e.g., medication or alcohol) or another medical condition.

Source: Reprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (Copyright 2013). American Psychiatric Association.

TABLE 7.3 Stressors Related to Developing Post-Traumatic Stress Disorder

TYPE OF STRESSOR	EXAMPLES
Serious accident	Car, plane, boating, or industrial accident
Natural disaster	Tornado, hurricane, flood, or earthquake
Criminal assault	Being physically attacked, mugged, shot, stabbed, or held at gunpoint
Military	Serving in an active combat theater
Sexual assault	Rape or attempted rape
Child sexual abuse	Incest, rape, or sexual contact with an adult or much older child
Child physical abuse or severe neglect	Beating, burning, restraints, starvation
Hostage/imprisonment/torture	Being kidnapped or taken hostage, terrorist attack, torture, incarceration as a prisoner of war or in a concentration camp, displacement as a refugee
Witnessing or learning about traumatic events	Witnessing a shooting or devastating accident, sudden unexpected death of a loved one

Source: Vermetten & Lanius (2012, p. 293).

PTSD has been an important focus of the U.S. Department of Veterans Affairs in that PTSD shows in greater numbers in the military than in the general population. Part of this results from the nature of current military actions in war in which small groups of soldiers go out from the base and cannot predict when there will be an attack. In this situation, there is not a traditional front line. Further, roadside bombs and suicide bombers present additional dangers. Thus, soldiers find their lives under constant threat. Among the

Vietnam veterans, lifetime prevalence of PTSD is estimated to be 30.9% for men and 26.9% for women (<https://www.ptsd.va.gov/professional/treat/essentials/epidemiology.asp>). For Gulf War (1991) veterans, the lifetime prevalence was lower and estimated to be around 10% to 12%. The Iraq War estimates are around 13.8%. Soldiers who were in recent war zones have not only experienced PTSD but also mild traumatic brain injuries (TBIs), usually in the form of concussions.

During the 1980s, a U.S. government research investigation, the National Vietnam Veterans Readjustment Study (NVVRS), led to the establishment of a 17-symptom definition of PTSD, which remained part of the *DSM* for the next 25 years. The study itself concluded that 30% of Vietnam veterans met the criteria for PTSD at some point in their life, and some 15% still showed the symptoms. In 2006, a reanalysis of the original data with more specific definitions of the criteria resulted in the original estimates being reduced from 30% to 19% (Dohrenwend et al., 2006). It was also suggested that 9% of the veterans still showed PTSD symptoms. Further, it was shown that symptoms were directly related to combat experience and that more symptoms were experienced by those with more combat experience.

In 2015, a study was published that followed up on the Vietnam veterans nearly 40 years after the end of the war (Marmar et al., 2015). This study found lifetime PTSD experiences to be 17% for males and 15.2% for females. Rates for those who still showed signs of PTSD were 4.5% for males and 6.1% for females. Similar data have been found for veterans of Iraq and Afghanistan (Kok, Herrell, Thomas, & Hoge, 2012).

At this point, you might also think being part of a war, including being in the general population in a war zone, would increase your chances of experiencing PTSD, and you would be correct (Nandi, Crombach, Bambonye, Elbert, & Weierstall, 2015). This is especially true of those who were abducted to be child soldiers as described in the *Cultural LENS: Child Soldiers in Africa*.

Those who took part as soldiers in civil wars were also found to suffer from mental health problems including PTSD. However, in battles in the Democratic Republic of the Congo in Africa, there was a difference for those who volunteered versus those who were forcibly recruited (Hecker et al., 2013). Those who were forcibly recruited were the ones who showed the signs of PTSD.

Further, in a study in Burundi in Africa in which 95% were volunteer soldiers, self-perpetrated violence such as killing did not lead to trauma-related disorders such as PTSD (Nandi et al., 2015). As part of this research, it was determined that some individuals seek to commit violent acts and do not experience distress with these actions. Rather, they find these behaviors appealing, fascinating, and exciting (Elbert, Weierstall, & Schauer, 2010). This is referred to as *appetitive aggression* (Elbert, Schauer, & Moran, 2018).

DSM-5 CRITERIA FOR PTSD

The *DSM-5* diagnostic criteria for PTSD shown in *Table 7.2* include a variety of traumatic experiences followed by negative reactions. First, the individual is exposed to aversive experiences involving the potential for injury or assault. Repeated exposures of first responders collecting body parts or police investigating child abuse are also included in the definition. Second, following the exposure, the individual experiences intrusions related to the exposure. These intrusions can include flashbacks in which the individual relives the experience, dream content related to the experience, distressing memories of the event, and distress or physiological reactions to reminders of the event. Third, the individual avoids stimuli involved with the traumatic event. These stimuli could include people, places, or things associated with the event as well as internal thoughts or feelings. Fourth, the individual experiences changes in cognitive processes such as an inability to remember important aspects of the event, negative attributions about one's self, blame of others, negative emotions,

CULTURAL LENS

Child Soldiers in Africa



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There is another group of individuals whose involvement in armed conflict and wars has been associated with psychological disorders. These are children who have been forced to be part of armed forces in Africa. Since the early 2000s, a number of African countries including Angola, Burundi, the Central African Republic, Chad, Cote d'Ivoire, the Democratic Republic of Congo, Guinea, Liberia, Rwanda, Sierra Leone, Somalia, and northern Uganda have experienced armed conflict that involved child soldiers (Betancourt et al., 2010; Schauer & Elbert, 2010). In fact, it has been estimated by the United Nations that 250,000 boys and girls have been involved in armed conflict at any given time over the last two decades.

These child soldiers experience a world around them that includes severe violence, which they may be a part of. During the critical pre-teen and teen developmental periods, they can be experiencing social isolation at a time in which children and adolescents are developmentally making friends and being parts of peer groups. In addition, they

themselves may also be committing cruelties and atrocities of the worst kind. This exposure to traumatic stress and isolation as they are developing can result in mental and physical disorders including PTSD.

One 16-year-old described his experience as follows:

When you would not follow the commander's rule, he could get very angry. People would get beaten terribly for disobedience or if they were trying to escape. When their wounds were open and bleeding, salt was rubbed inside their wound. In that the commander was merciless. You had to follow the rules or you would lose the 'protection'. When people did something really wrong, they got killed as a punishment. (from Schauer & Elbert, 2010)

These experiences suggest that child soldiers suffer from being both the one who experiences violence and also the one who perpetrates violence on others during armed conflict. Overall, a child soldier would have experienced abduction, traumatic exposure of various types, and disruptions of normal developmental stages, which in turn are associated with maladjustment. A number of studies show that psychological problems including PTSD are common among former child soldiers (Elbert, Schauer, & Moran, 2018; Ertl, Pfeiffer, Schauer-Kaiser, Elbert, & Neuner, 2014).

Thought Question: Sometimes thinking about extreme situations can lead to insights, or at least new questions to ask, in other contexts. How might the example of child soldiers lead us to new questions on the experience of a child growing up in a violent community? Or on the experience of an adult soldier in war?

detachment, lack of interests, and inability to experience positive emotions. Fifth, the individual experiences increased arousal and reactivity including sleep disturbances, irritability, and problems with concentration.

Overall, symptoms of PTSD should have lasted for more than 1 month and produced clinically significant distress. The following case of Victoria English (not her real name) on page 272 illustrates these symptoms in a person who experienced a bomb attack at the World Trade Center in New York City (in 1993, several years before the massive 9/11 terrorist attacks brought the buildings down).



The Marvel comic book and Netflix series superhero Jessica Jones's PTSD symptoms are often most apparent when she's hypervigilant during otherwise normal daily activities.

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Paramedics and other health care workers can also experience stress and PTSD.

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THE PHYSIOLOGICAL ASPECTS OF POST-TRAUMATIC STRESS DISORDER

Researchers who study PTSD may try to create stress using laboratory animals. They may expose animals to inescapable stress or repeated stressors. Similar stress responses as seen in humans are reported that include the CRF (corticotropin-releasing factor), which activates the HPA axis to cause release of ACTH and other chemical substances as described previously. This generally results in a lessened stress response to additional stimuli and an avoidance of novel situations.

In terms of brain structures, animal models of stress and trauma have shown that exposure to severe and chronic stress can damage hippocampal formation. This is seen to be mediated by elevated corticosteroids, which are thought to damage cells, diminish neuronal regeneration, and reduce dendritic branching. This has resulted in a variety of human studies examining the hippocampus in individuals with PTSD (Gilbertson, 2011; Shin, Brohawn, Pfaff, & Pitman, 2011).

In addition, an improved understanding of the cortical networks involved in the acquisition and extinction of fear have pinpointed specific brain regions connected with PTSD. These include the hippocampus, the amygdala, and the medial prefrontal cortex (PFC) as well as the default and salience networks (Yuan et al., 2018). The hippocampus is important because of its role in the encoding of memories including emotional ones. The amygdala is involved in the assessment of threat and plays a role in fear conditioning. The medial PFC, including the ACC, is involved in the inhibition of emotional information during task performance. These are the same brain areas involved in anxiety and fear processes. The brain areas involved in PTSD are shown in *Figure 7.7*.

In general, there is clear support for the idea that individuals with PTSD have smaller hippocampal volume than those without PTSD. In one meta-analysis (M. Smith, 2005), individuals with PTSD had, on average, a 6.9% smaller left hippocampus and a 6.6% smaller right hippocampus by volume. An intriguing idea is that stress limits the normal regeneration of new neurons in the hippocampus (Lucassen et al., 2013). ACC differences have also been noted in PTSD as well as reduced connectivity between the ACC and the amygdala. Although an important part of the fear network, consistent reductions have not been observed in the amygdala.

It is suggested that the hyperresponsiveness of the amygdala is related to the exaggerated fear response (Rauch, Shin, & Phelps, 2006). This may result from a lack of inhibition from the frontal areas to the amygdala. This would also be associated with the inability to inhibit or extinguish fear-related stimuli. The emotional opposite has also been found. That is, those with PTSD show less limbic responses to happy facial expressions, which may be related to emotional numbing (Felmingham et al., 2014). As you will see, *DSM-5* describes emotional numbing as inability to experience positive emotions.

TREATMENT FOR POST-TRAUMATIC STRESS DISORDER

One way to think about the physiological changes associated with trauma is to consider the networks involved on both an associative and cortical level. On an associative level, it has been suggested that some associations become more potent or “hot” than others that remain “cold” (Rockstroh & Elbert, 2010). It has been shown that repeated experiences of trauma will make it more difficult to integrate the experiences into less emotional or “cold” autobiographical memories. *Figure 7.8* illustrates such a network, in which being on a dark street results in a cognitive proposition such as “there is no way out” or “something bad is going to happen to me.” These thoughts would be followed by emotional and physiological responses related to stress. One goal of therapy is to help the individual move the hot trauma associations to a more cold, or nonreactive, memory process.

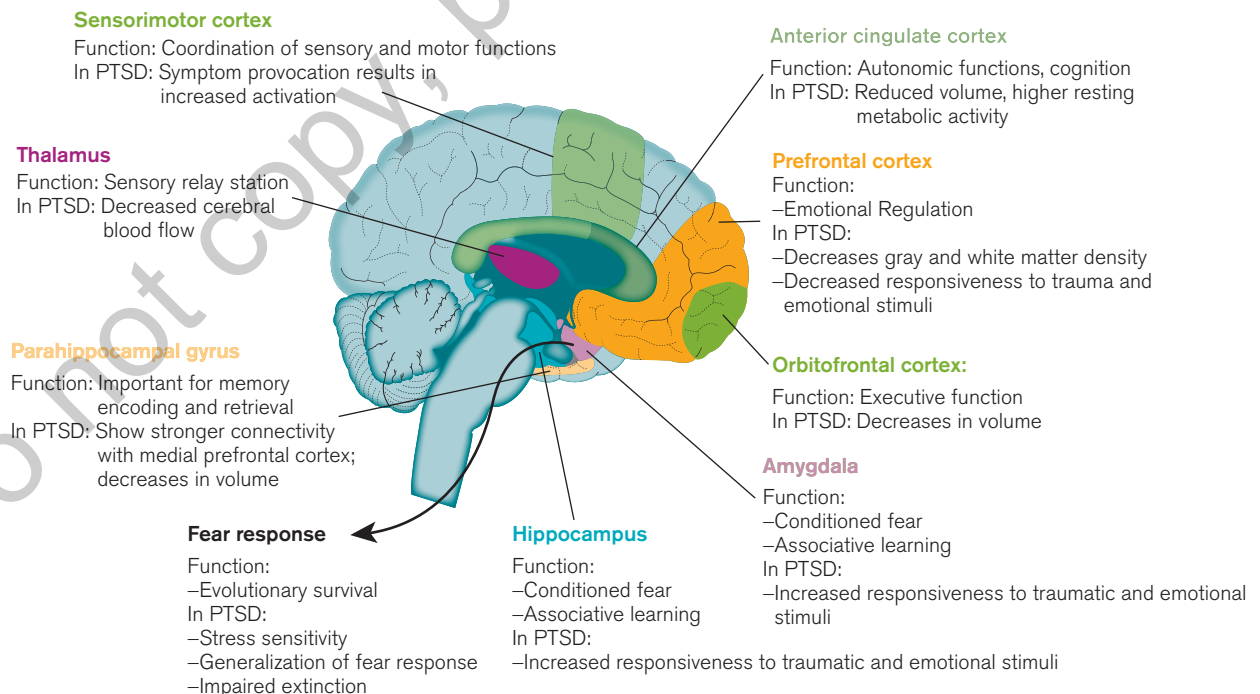
PTSD is frequently comorbid with other disorders such as depression, substance abuse, and anxiety disorders such as obsessive-compulsive disorder (OCD), panic disorder, agoraphobia, and social anxiety. For example, the National Vietnam Veterans Readjustment Study showed that 98% of individuals with combat-related PTSD had a comorbid lifetime mental disorder (Kulka et al., 1990). They also reported more physical health problems. This suggests that the treatment of PTSD requires more than a single strategy.

Given the plethora of symptoms seen in PTSD, pharmacological treatments have been varied and have included antidepressants, anxiolytics, adrenergic inhibitors, mood

FIGURE 7.7 What Are the Major Areas of the Brain Related to Psychological Stress and Trauma?

This figure shows the areas of the brain and their function in stress and trauma.

Source: Mahan & Ressler (2012), with permission from Elsevier.



CASE OF VICTORIA ENGLISH

Post-Traumatic Stress Disorder

Victoria English is a single woman in her early 30s. She occupied a position of significant authority in a large corporation. She sees herself as efficient and independent and has never sought mental health services in the past. On February 25, 1993, she was working in her office at the World Trade Center when a bomb exploded. In the initial interview, she showed little emotion when she described being blown into the air and landing on her arm. This resulted in her having a broken arm. During the interview, Ms. English became more tearful and frightened as she described the bombing and how it affected her life. Specifically, she is currently feeling vulnerable and reported difficulties with the demands of her job. When she returned to work 2 weeks after the bombing, she reported being anxious on the subway. She began to work from home. The company physician, after consulting with her, suggested that she obtain a temporary disability and discontinue working.

During Ms. English's assessment, she was administered a Structured Clinical Interview for DSM Disorders (SCID) and met criteria for PTSD. Her symptoms included nightmares and intrusive

daytime recollections. These could bring her to tears. She also had intrusive fantasies of catastrophic events, such as buildings falling on people, as she went about her daily life. Ms. English also avoided situations such as riding the subway or going to the World Trade Center, which would make her feel vulnerable or remind her of the bombing. She also found herself cut off from others even when they reached out to her. She began cognitive processing therapy with cognitive behavioral components. By the end of therapy, her level of functioning had greatly improved. At the 1-year follow-up, she reported that she was doing well and had moved to a new city and become romantically involved with someone who would become her husband. She also reconsidered her priorities and according to her began to live a more balanced life. At the 2.5-year follow-up, she no longer met criteria for PTSD although she reported minor types of psychological distress.

From "Cognitive Processing Therapy for PTSD in a Survivor of the World Trade Center Bombing: A Case Study," Difede, J., & Eskra, D., *Journal of Trauma Practice*, (2002) 1, 155-165. Reprinted by permission of Taylor & Francis Ltd, <http://www.tandf.co.uk/journals>.

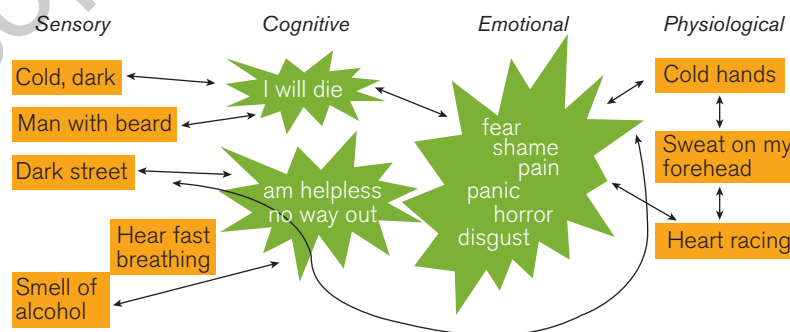
FIGURE 7.8 Sensory, Cognitive, Emotional, and Physiological Processes Involved in Experiencing Stress

This figure shows the areas of the brain and their function in stress and trauma.

Source: Rockstroh & Elbert (2010, p. 15), with permission from Elsevier.

Example of the seed of a 'trauma network'

Elements of 'hot' memory



Elements of 'cold' autobiographical memory

I worked as secretary I lived in Berlin It was shortly before Christmas I had left the office late

stabilizers, and anticonvulsants. Overall, drug treatments were shown to be superior to placebos in reducing symptoms of PTSD (M. Friedman & Davidson, 2014). New drugs are also being tested that influence the ability to remember traumatic events. For example,

UNDERSTANDING CHANGES IN DSM-5

PTSD Definitions in *DSM-IV* and *DSM-5*

With the publication of *DSM-5*, there were changes to PTSD criteria. PTSD was moved from the section of the *DSM* on Anxiety Disorders to a new section on Trauma- and Stressor-Related Disorders. Eight of the original 17 PTSD symptoms, which had not been changed for 25 years, were changed and reworded. Three additional symptoms were added. In addition, avoidance symptoms have been separated from numbing. That is, avoiding stimuli is differentiated from not reacting to the stimuli. For a diagnosis of PTSD in *DSM-5*, both effortful avoidance and changes in negative mood and cognition must be present. Whereas *DSM-IV* characterized numbing as a restricted range of affect and reduced ability to feel emotions, *DSM-5* changed that to an inability to feel positive emotions.

Charles Hoge and his colleagues (2014) compared the different criteria with veterans from Iraq and Afghanistan. They found that the new criteria did not affect the soldiers' willingness to report symptoms. However, they found that the new criteria did not have greater clinical utility. That is, using the new criteria did not influence how the PTSD was treated. Further, 30% of the soldiers who met the PTSD criteria under *DSM-IV* did not meet the criteria under *DSM-5*. This has implications for both research and treatment of PTSD. Also, an equal

number of individuals only met the PTSD criteria under *DSM-5*. Further, in a study of traumatized refugees to Switzerland, different rates in PTSD diagnosis were found to be related to whether the clinician used *DSM-IV* or *DSM-5* (Schnyder et al., 2015). Using *DSM-IV*, 60.4% of the traumatized refugees were diagnosed with PTSD, whereas only 49.3% were diagnosed with *DSM-5*. Differences in diagnosis were also found with a sample of fighters in the Democratic Republic of the Congo (Schaal, Koeback, Hinkel, & Elbert, 2015). Thus, those diagnosed with *DSM-IV* PTSD will be different from those diagnosed with *DSM-5* PTSD.

These differences are troubling to many (McFarlane, 2014). PTSD diagnoses are used in legal jurisdictions and for determining pensions. Further, research would also be different between those with *DSM-IV* criteria and those with *DSM-5* criteria. For example, neuroimaging studies show two different patterns of emotional reactivity. One of these is underreactivity and the other is emotional overreaction. However, neither of these patterns involves only positive affect as required by *DSM-5*. Overall, professionals in all areas of society, from legal professionals to mental health professionals to researchers, need to be aware of how *DSM-IV* and *DSM-5* determine the diagnosis of PTSD.

research on animals has shown that the dopamine D₁ receptor is involved in processing emotional information in the PFC. If these receptors are manipulated, it is possible to block the experiencing of emotional memories (Lauzon, Bechard, Ahmad, & Laviolette, 2013).

At present, the most effective therapies for PTSD are cognitive and behavioral (Bisson & Andrew, 2007; Bradley, Greene, Russ, Dutra, & Westen, 2005; M. Friedman et al., 2014; Frueh et al., 2018; Ursano et al., 2008). In fact, PTSD is one of the *DSM* disorders that is mainly treated using psychotherapy. The most studied therapies include **exposure therapy for PTSD**, cognitive behavioral therapy (CBT) and cognitive restructuring, and eye movement desensitization and reprocessing (EMDR). One key ingredient of most therapies is a controlled reexperiencing of the original trauma. Psychodynamic therapies refer to this as *catharsis*. The task is for the client to reexperience the original trauma in a safe and controlled environment such that its negative emotional effect is reduced. Reviews have shown that therapies that focus on the trauma that the individual encountered are more effective than those that do not (Bisson & Andrew, 2007). *LENS: Post-Traumatic Stress Disorder and Suicide in the Military* examines stress-related disorders and suicide in the military.

Exposure therapy for PTSD is designed to have the individual with PTSD reexperience the original trauma (Foa, Gillihan, & Bryant, 2013). In this way, the person confronts her

fears and expectations such that they are reduced. One common procedure for doing this is through *imagery*. The therapist helps the person remember and image the details of the experience, including the factors that led up to the event. In some situations such as a car accident, the therapist and the client may actually go to the location of the event so the client can reexperience in detail the situation. One goal of the therapy is to have the person develop a sense of mastery over the situation.

Another approach has used narrative exposure therapy (NET) to treat those with trauma (Schauer, Neuner, & Elbert, 2011). This approach begins with the idea that a fear/trauma network in the brain builds up memories of very stressful, traumatic, and frightening experiences (as previously illustrated in *Figure 7.8*). Since this information is often stored without a sense of time, when recalled it can flood into a person's experience as if it is happening in the present. The goal of NET is to break up this network. The procedure begins with the child, adolescent, or adult being asked to see his or her experiences as being along a rope representing the person's life in terms of positive and negative emotions. In the following sessions, the individual reports the most arousing experiences beginning at birth. As the person reexperiences the event, he or she is able to place it in a particular context rather than experiencing a global reaction. The therapist helps the person describe specific details such as the weather that day, the color of the house, and so on. One outcome is that the individual learns to have greater control over the fear and terror memories. This approach has been shown to be effective for treating trauma in a number of groups including former African street children (Crombach & Elbert, 2015).

Written exposure therapy (WET) is a brief, five-session, trauma-focused intervention in which individuals are asked to write about their traumatic experience following scripted instruction (Sloan, Lee, Litwack, Sawyer, & Marx, 2013). The first session includes psychoeducation about PTSD along with a treatment rationale followed by 30 minutes of writing. At the beginning of each subsequent session, therapists provide feedback to individuals about the degree to which they followed the writing instructions during the prior session and offer suggestions for adhering to the treatment protocol. After this feedback, individuals write for 30 minutes without interruption. Written exposure therapy does not include any assignments between sessions. WET has been shown to be an effective therapy (Sloan, Marx, Lee, & Resick, 2018).

EMDR is a form of therapy in which a person imagines the traumatic situation while moving his or her eyes (F. Shapiro, 2001, 2013). The basic idea is that PTSD is related to unprocessed memories in the brain. The purpose of therapy is to reactivate these stored memories through direct processing. The person is told to keep his head still and follow the therapist's finger (or a light panel) with his eyes while imagining the trauma. The procedure is repeated until the person no longer experiences distress. Although the procedure has been shown to be effective with PTSD, neuroscience perspectives are just beginning to be articulated (Calancie, Khalid-Khan, Booij, & Munoz, 2018). However, EMDR remains controversial (M. Russell, 2008).

Cognitive behavioral approaches, as described previously, seek to modify dysfunctional thoughts and train the individual with PTSD to consider new ways to interpret the situation. One important focus is to help the person restructure her way of thinking and feeling. One way of doing this is to have the person identify the thoughts, such as "I am going to be hurt," that precede the negative emotions experienced in PTSD. Likewise, if a woman had been raped, she might blame herself for being in the



The U.S. Department of Defense is using virtual reality techniques as a means of treating post-traumatic stress disorder for those who served in Iraq, Afghanistan, and other combat locations.

John J. Kruzal/US Department of Defense

LENS

Post-Traumatic Stress Disorder and Suicide in the Military



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As noted in the chapter on mood disorders, there is currently a higher rate of PTSD and depression in the U.S. military than in the general population. The rate of suicide is also higher in the military, a finding that has not been seen since the war in Vietnam. This has resulted in concerns by the military, government officials, and mental health professionals. A number of studies have been conducted to understand these troubling statistics.

In 2008, the RAND Corporation published a report on the psychological consequences of military deployment over the past decade, *Invisible Wounds of War* (Tanielian & Jaycox, 2008). Since 2001, more than a million and a half U.S. troops have been deployed in Iraq and Afghanistan. These troops have been deployed for longer periods and faced combat in smaller groups than troops in previous wars. Given the advances in body armor and medical technology, fewer deaths have resulted compared with Vietnam and Korea. However, what has become apparent is that these individuals have experienced mental health issues and brain trauma not initially apparent—referred to as *invisible wounds*. It is estimated that one third of all soldiers involved in combat over the past decade have such an invisible condition including PTSD, depression, or TBI (traumatic brain injury). Further, 5% of these individuals display symptoms of all three. Given that this is a higher rate of PTSD and depression than that seen in the general population, it is surprising and disturbing that these military personnel only sought help from mental health professionals at about the same rate

as the general population. Roughly half of those who met the criteria for PTSD, depression, or TBI had sought help in the year preceding the RAND study. An important reason given for not seeking help was that the soldiers were concerned that the information would not be kept confidential and would hurt future job searches or military advancement.

Not seeking help for a mental condition not only has consequences for the individual himself, but also for society in general. Often, individuals with stress-related disorders show other problems such as substance abuse, as well as problems in their marriage and social relationships. For society, these conditions can lead to missed days at work, lower productivity, and even homelessness and suicide. However, there is potential to deal with these problems. The RAND report estimates that evidence-based treatments for depression and PTSD would pay for themselves within 2 years and save the country as much as \$1.7 billion in lost productivity annually. For both the individual and society, there is great value in not having the person become homeless or commit suicide. There is also increased quality of life for the individual that results from effective treatments of these disorders.

Based on their research, the RAND Corporation made four recommendations:

1. Increase the cadre of providers who are trained and certified to deliver proven (evidence-based) care, so that capacity is adequate for current and future needs.
2. Change policies to encourage active duty personnel and veterans to seek needed care.
3. Deliver proven, evidence-based care to service members and veterans whenever and wherever services are provided.
4. Invest in research to close information gaps and plan effectively.

Thought Question: What are some ways to ensure that our society treats the “invisible wounds” of war as seriously as the more visible physical wounds our military personnel experience?

situation and say, “It is all my fault.” The therapist would help this person to reconsider this belief and replace it. Overall, the CBT process is one of identifying dysfunctional thoughts, evaluating their validity, and replacing them with more productive ones.

An approach used to treat the co-occurrence of PTSD and substance abuse is referred to as *seeking safety* (Najavits, 2002). Seeking safety has been empirically supported by research and consists of five central ideas. The first is safety as the priority of treatment. *Safety* is an umbrella term that includes discontinuing substance abuse, reducing suicidality, reducing self-harm, and letting go of bad relationships such as those that involve the use of drugs. The second idea is that of an integrated treatment that addresses PTSD and substance abuse together. The third idea is a focus on ideals such as the meaning of one’s life that are typically lost in the experience of PTSD and substance abuse. The fourth idea incorporates CBT with its emphasis on cognitive, behavioral, interpersonal, and action domains. The fifth idea emphasizes the relationship between the individual and the mental health professional (see also <http://www.treatment-innovations.org/seeking-safety.html>). Two processes seen in other therapies for PTSD are not included in seeking safety. The first is the exploration of past trauma. There is a lack of evidence that exploring past trauma with those with substance abuse is beneficial. The second is the use of interpretive statements such as those seen in dynamic therapy. Although useful in some types of therapy, these are seen as potentially upsetting in the initial treatment of PTSD and substance abuse.

Additional new and improved treatment approaches are being developed within the context of modern technology and more sophisticated treatment research. Since many types of trauma-related disorders are largely environmentally determined, this allows for prevention programs. One aspect of prevention can include bringing the psychological situation that led to trauma to light. Currently, sexual assault in the military is one example in which prevention programs have been developed. Another aspect of prevention is helping those who have experienced trauma to recognize the signs and symptoms of psychological distress and learn how to seek help. Assaults against children have also been focused on by many communities and states with the goal of prevention and treatment.

CONCEPT CHECK

- When a negative event occurs to an individual, what criteria would you use to distinguish between a normal emotional reaction and an adjustment disorder?
- What are the five categories of clinical symptoms that describe acute stress disorder?
- PTSD results from an experienced threat. What are some of the common traumatic stressors?
- How are specific areas of the brain involved in PTSD?
- What are the most effective therapies for PTSD? Give three examples, and explain the focus of each related to treating PTSD.

SUMMARY

Psychological stress is experienced when something we do not expect and cannot control happens to us. At times, these experiences lead to strong emotional reactions and at other times to psychological disorders such as PTSD. Understanding the manner in which stress and trauma are related to health and psychopathology is complicated. Overall, early stress has been associated with both later

mental and physical health problems, due to the fact that stressful experiences change both psychological and physiological reactions to future stressful experiences. Our physiological reactions to stress and trauma occur on a variety of levels including the tagging of genes (epigenetics), the reaction of the immune system, the endocrine system involving the HPA axis, the ANS, and changes in cortical processes.

Over evolutionary time, the processing of social pain appears to have co-opted the basic brain structures involved in physical pain. Pain research suggests that there are two separate components to the experience of pain: (1) the sensory experience itself and (2) the felt unpleasantness. It is the experience of unpleasantness that appears to be altered in psychopathology and is most sensitive to psychological factors.

Our immune system has evolved to recognize a variety of pathogens. It comes into play in terms of specific pathogens such as viruses and also in terms of stress. The immune system is influenced by the brain and vice versa. Organisms have evolved sophisticated mechanisms, which benefit survival. The basic mechanism is to prepare the body for action through two pathways: (1) the ANS and (2) the HPA axis. The overall stress reaction has been referred to as the fight-or-flight response. This reaction has been critical throughout our evolutionary history, but today, in our different social structure, it may lead to stress-related disorders. Given the different evolutionary pressures on males and females, it has been suggested that the fight-or-flight response better describes a human male's response to stress, while the tend-and-befriend response better describes the female's. However, the basic neuroendocrine responses to stress appear to be similar in both males and females.

Early stress research by Selye found that the body reacts similarly to a variety of different stressors. Selye called this response the general adaptation syndrome (GAS). One of the paradoxes was that the physiological stress responses that protect and restore the body can also damage it. However, repeated exposure to a particular stress situation could also increase the organism's ability to withstand that same stress in greater amounts. McEwen suggested that the

term *stress* be replaced with the term *allostasis*, which refers to the body's ability to achieve stability through change. The stress response involves two tasks for the body: (1) turning on the allostatic response that initiates a complex adaptive pathway—for example, the fight-or-flight or tend-and-befriend response—and (2) turning off these responses once the danger has passed. Research suggests that prolonged exposure to stress may not allow these two mechanisms to function correctly and in turn leads to a variety of physiological problems. Overall, McEwen emphasized the important question of individual differences and the variety of ways in which perceived stress can influence future health.

There are several disorders in *DSM-5* that result from the experience of stress. The most significant are adjustment disorders, acute stress disorder, and PTSD. The severity of the stressor is the least in an adjustment disorder and the greatest in PTSD. Diagnosis of an adjustment disorder does not require specific symptoms but more global distress, whereas acute stress disorder and PTSD do require specific symptoms. Whereas acute stress disorder is a short-term reaction to trauma, PTSD is present when the reaction lasts more than 1 month. PTSD is frequently comorbid with other disorders such as depression; substance abuse; and anxiety disorders such as OCD, panic disorder, agoraphobia, and social anxiety. This suggests that the treatment of PTSD requires more than a single strategy. Drug treatments reduce symptoms of PTSD; however, at present, the most effective therapies for PTSD are cognitive and behavioral. The most studied therapies include exposure therapy, CBT and cognitive restructuring, and EMDR. One key ingredient of most therapies is a controlled reexperiencing of the original trauma, referred to as catharsis. New programs related to prevention are also being developed by both communities and the military.

STUDY RESOURCES

REVIEW QUESTIONS

- What are specific examples of how past stressful experiences change both our psychological and physiological reactions to future stressful situations in relation to
 - Psychological factors?
 - Developmental changes in the brain?
 - Genetic factors?
 - Epigenetic modifications?
 - Endocrine factors?
 - Economic and social factors?
- In the study of stress, researchers Selye and McEwen both referred to the paradox that the same physiological stress responses that protect and restore the body can also damage it. In terms of that paradox, please answer the following questions:
 - How did our stress responses evolve, and what led to the paradox?
 - How do our stress responses protect and restore our body and mind?
 - How can our stress responses damage our body and mind?
- DSM-5* includes three psychological disorders that result from the experience of stress—adjustment disorder, acute stress disorder, and PTSD. For each disorder, please answer the following questions:

- a. What are examples of triggering events and common symptoms?
- b. What are the diagnostic criteria?
- c. What is the prevalence?
- d. What are effective treatments?

FOR FURTHER READING

- Barlow, D., Rapee, R., & Perini, S. (2014). *10 steps to mastering stress* (updated ed.). New York, NY: Oxford University Press.
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- Johnston, E., & Olson, L. (2015). *The feeling brain: The biology and psychology of emotions*. New York, NY: W. W. Norton.
- Sapolsky, R. (2004). *Why zebras don't get ulcers* (3rd ed.). New York, NY: St. Martin's Griffin.

KEY TERMS AND CONCEPTS

acute stress disorder 261	fight-or-flight response 252	post-traumatic stress disorder (PTSD) 261
adjustment disorders 261	general adaptation syndrome (GAS) 257	psychological stress 248
allostasis 257	hypothalamic–pituitary–adrenal (HPA) axis 251	psychoneuroimmunology 254
allostatic load 257	immune system 250	sympathetic division 252
autonomic nervous system (ANS) 250	parasympathetic division 252	tend-and-befriend response 259
exposure therapy for PTSD 273		



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