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LEARNING OBJECTIVES

This chapter is designed to enable you to:

- Define stress and outline aspects of stress, including (a) appraisal and (b) stress responses.
- Describe physical responses to stress and discuss variations, (a) between individuals and (b) between situations, in how we respond physically to stress.
- Discuss the relationship between stress and physical health, and outline the factors that protect us or make us more vulnerable to illness following stress.
- Understand some of the psychological consequences of stress, including burnout.

Most people think that stress is bad for us. In fact, stress is not always bad for us – a small amount of stress is necessary for us to rise to challenges such as competitions or exams. However, long-term stress is indeed negative in its effects: there is a lot of evidence linking stress to adverse outcomes like depression, burnout, and cardiovascular disease. Stress is also associated with infections, slower recovery, and a worsening of symptoms in illnesses such as asthma, herpes, and rheumatoid arthritis (Steptoe & Ayers, 2005). In this chapter we look in more detail at stress, our physical responses to it, how it can affect our physical and mental health, and what can protect us against stress.

3.1 WHAT IS STRESS?

The concept of stress originated in physics and mechanical engineering to describe the internal forces in a system caused by external pressures, such as the pressure of water or wind on a bridge. Over time the word stress has become widely used to mean many things, including a negative situation, a feeling of pressure, tension, or negative emotion. According to the psychological definition, stress occurs when demands are appraised as exceeding a person’s resources to cope.

Like emotion, stress has many components and first it is necessary to distinguish between stressors and stress responses. Stressors are external or internal events that may trigger stress responses. If, for example, you feel stressed because you are sitting an exam, we may...
say that the exam is acting as an external stressor. If, on the other hand, you feel stressed because you are torn between helping a friend who needs you and revising for that exam, the stress is caused by an internal stressor (your conflicting desires). Stressors can be further divided according to their type or duration, such as acute stressors (e.g. the death of a relative), chronic stressors (e.g. caring for a sick relative), daily hassles (e.g. problems getting to work), traumatic stressors (e.g. an assault), and role strain (e.g. balancing home and work roles). Not everyone responds to the same stressors in the same way.

Stress responses are the various ways we respond to a stressor. These can be divided into cognitive, affective, behavioural, and physiological responses. Interestingly, there is not always a strong association between these different responses. In other words, it is possible for a person to have a strong physiological response to a stressor but not report feeling emotionally stressed. This is apparent in people who have a repressive coping style who, when put under stress, will report little or no emotional distress but show strong physiological responses (Myers, 2010). A commonly used questionnaire measure of stress is given in Box 3.1 so you can consider how stressed you are.

**BOX 3.1  How stressed are you?**

<table>
<thead>
<tr>
<th>During the last month how often have you...</th>
<th>Never</th>
<th>Almost never</th>
<th>Sometimes</th>
<th>Fairly often</th>
<th>Very often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Been upset because of something that happened unexpectedly?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Felt that you were unable to control the important things in your life</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Felt nervous and ‘stressed’?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Felt confident about your ability to handle your personal problems?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Felt that things were going your way?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Found that you could not cope with all the things that you had to do?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Been able to control irritations in your life?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Felt that you were on top of things?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Felt angered because of things that were outside of your control?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Felt difficulties were piling up so high that you could not overcome them?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Scoring: Add your scores together. Scores range from 0–40. The average score for people aged 18–29 is around 14; aged 30–44 is 13; >45 years is approximately 12.

3.1.1 PHYSICAL RESPONSES TO STRESSORS

Understanding physical responses to stressors is critical to explaining the link between stress and disease. Our understanding of physical responses to stressors initially comes from research in the 1950s detailing the physiological fight-flight response. The fight-flight response involves the sympathetic branch of the autonomic nervous system as a fast, first-wave response; and the endocrine pathways of the hypothalamic-pituitary-adrenal (HPA) axis as a slower, second-wave response. The sympathetic nervous system (SNS) and HPA responses are illustrated in Figure 3.1. The SNS directly activates body systems to prepare the body for immediate action. The adrenal medulla is stimulated to produce stress hormones such as adrenaline (epinephrine) and noradrenaline (norepinephrine). This causes stimulation of the heart and lungs and the diversion of energy away from unnecessary functions, such as saliva production, digestion, and reproduction.

At the same time, the HPA axis is activated so the hypothalamus releases corticotrophin releasing factor, which then sets off a cascade of endocrine events culminating in the release of cortisol and other hormones from the adrenal cortex. Cortisol is a steroid and is a critical stress hormone. It results in an increase in blood sugar levels and metabolic rate, hence further supporting the body in the need for fight or flight. It also influences the regulation of blood pressure, the immune system, and the inflammatory response. Normally, the HPA axis works as a negative feedback loop so the presence of cortisol in the blood stream triggers the hypothalamus to stop producing corticotrophin releasing factor. Thus cortisol will usually return to normal levels 40 to 60 minutes after a stressful event. However, under prolonged periods of stress the HPA axis can become dysregulated and result in chronically elevated levels of cortisol. In the long term this has negative effects, such as the accumulation of abdominal fat and the wasting of bone and muscle tissue. The effects of excess cortisol are illustrated by Cushing’s syndrome – where there is overproduction of cortisol (hypercortisolism). People with Cushing’s syndrome have large amounts of fat on their abdomen and face, sweating, thinning of the skin, stretch marks, and facial hair. In some cases it also leads to sleep problems, reduced sexual function, reduced fertility, increased depression, and anxiety.

Understanding of physical responses to stressors has developed substantially since the fight-flight responses were first identified. It is now clear that physiological responses to stressors vary according to the characteristics of a situation. Research with animals shows that stronger physiological stress responses occur in situations that are novel, unpredictable, or uncontrollable. Research examining this in humans is broadly consistent with the findings from animal research. For example, a study of commuters found that those who rated aspects of their journey as unpredictable reported more stress and had higher cortisol levels (Evans et al., 2002). Similarly, research generally indicates that a lack of control is associated with greater stress and a more negative impact on health (Walker, 2001). A study of over 5,000 retired adults in the USA found that the effect of chronic stress on physical frailty was fully mediated by perceived control (Mooney et al., 2016) – i.e. a high sense of control overcame the expected effect of chronic stress on frailty.
FIGURE 3.1  Fight-flight responses to stressors

This has led to the view that it is important to empower people and encourage them to have as much perceived control as possible. Though this is usually true, there is not a simple blanket effect of perceived control on health and it can be moderated by a number of factors. For example, another study of 6,135 adults in the USA found that stronger beliefs of control over one’s life were associated with less risk of dying prematurely for people with low levels of education, but not for those with high levels of education (Turiano et al., 2014). It is also worth noting that if a situation is essentially uncontrollable, encouraging someone to strive for control might result in more stress. The evidence for this is not consistent but, if this is the case, it has important implications for uncontrollable situations in healthcare, such as births that involve obstetric complications that women cannot predict or control. In these circumstances, it may be unhelpful to encourage women to strive for control and perhaps more emphasis should be placed on supporting them through such events.

People also vary in how they respond physiologically to stress. Some individuals are more responsive than others. This is called stress responsivity. Studies of twins, epigenetic studies, and animal studies indicate that stress responsivity is partly genetically determined but that the early environment is critical in altering and shaping our physical and behavioural responses to stressors. Babies of mothers who had high levels of stress and anxiety during pregnancy are more responsive to stressors, show more anxiety and fearfulness, and are more likely to have cognitive and attentional problems (Talge et al., 2007). This is referred to as fetal programming and makes sense from an evolutionary perspective, because offspring born into a stressful or dangerous environment will need exaggerated stress responses to survive (see also Chapter 14).

The environment is important in shaping infants’ stress responses. Animal studies show that offspring of more nurturing mothers have reduced HPA axis responses through less corticotrophin releasing factor (see Figure 3.1) and enhanced negative feedback (Champagne & Meaney, 2001). In addition, the mere presence of the mother alters and reduces their offspring’s physiological responses to stressors (Debiec & Sullivan, 2016). Thus, individuals vary in their levels of stress responsivity and this is determined by nature and nurture. Classic studies conducted in the 1990s show that young children differ in their level of cardiovascular or immune responsivity to stressors. Children who were less responsive to stressors had a similar risk of respiratory illnesses whether they were raised in high or low adversity settings – nicknamed ‘dandelion children’ because of their relative resilience under different conditions of adversity. Children who were highly responsive to stressors and lived under high adversity had substantially more illness than all other groups of children. However, unexpectedly, children who were highly responsive but lived in low adversity settings (i.e. supportive family or care settings) had the lowest rates of illness (Boyce et al., 1995). These children were nicknamed ‘orchid children’ to illustrate their sensitivity to their early environment. This finding has since been replicated in many studies: children who are more responsive to their environment have the best or worst outcomes depending on whether they are raised in a positive or negative environment,
respectively. This is found for both physical and psychological health outcomes (Del Giudice et al., 2011) (see also Chapter 8).

The fight-flight response provided the initial basis of our understanding of physical responses to stressors. However, the matter is more complex than this. In particular, there is more variation between individuals than the above explanations imply. There is also evidence that fight-flight is only one way of responding to stressors and that an alternative response is a **tend and befriend** response, where animals and humans tend to their offspring (tend) and seek out others for safety and comfort (befriend) (Taylor, 2012). Tend and befriend responses are more commonly displayed by females so it has been argued that fight-flight responses may be more relevant to males.

The biological basis of affiliative responses to stressors is the hormone oxytocin in conjunction with endogenous opioids. There is substantial evidence from animal studies for the importance of oxytocin and opioids in affiliative behaviours. For example, administering oxytocin and/or opioids leads to an increase in maternal and other prosocial behaviours (Lim & Young, 2006). However, if male animals are injected with oxytocin and then subjected to stressors they are more likely to nurture any young animals present and show tend behaviours (Taylor, 2012).

There is also accumulating evidence from research with humans that oxytocin and opioids are involved in affiliative behaviours and attachment to others. For example, rises in oxytocin and endogenous opioids occur in women during labour, breastfeeding, and in both men and women during sex, which are presumably to increase affiliation and bonding. Increased oxytocin is also observed in people who are socially isolated or those with poor quality relationships – presumably because they need to seek social affiliation (Taylor et al., 2009). The opioid system is involved in reducing physical pain but also in reducing separation distress. Researchers have therefore argued that coping with social pain (as in loss and separation) might be based on similar physiological mechanisms to physical pain (Way & Taylor, 2009).

The tend-befriend response also reduces the negative effects of stressors. Oxytocin is associated with reduced physiological stress responses and psychological distress. Studies administering oxytocin to animals show it reduces fearful behaviour and increases exploration. In humans oxytocin is associated with decreased SNS and HPA activity (Taylor, 2012). It is therefore thought that, although fight-flight responses are good for acute resolution of threatening events, social affiliation and tend-befriend responses can buffer against the long-term negative impact of stressors on health. This is consistent with the extensive literature showing the importance of social support in health (see section 3.2.2). Figure 3.2 summarises how affiliative responses might decrease stress responses.

It can be seen that the fight-flight response to stressors is well established but is not the only biobehavioural response to stressors. Tend-befriend responses and the importance of affiliation and social relationships illustrate the notion that physical responses to stressors will differ according to circumstances, the individual, and the social context.
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In uncontrollable circumstances, such as an emergency situation, it may be more helpful to support people through it rather than encourage them to strive for control. Severe or chronic stressors are associated with poor health, so helping people manage and reduce their stress has the potential to reduce illness in the long term. The physical symptoms of stress will vary between individuals – some may experience cardiovascular symptoms, such as palpitations, whereas others may experience gastro-intestinal symptoms.

3.1.2 STRESS AND THE IMMUNE SYSTEM

Stress has various effects on the immune system, depending on the demands of the situation. Both the SNS and the HPA axis affect the immune system. The SNS increases immune system activity, particularly large granular lymphocyte activity such as natural killer cells. However, the HPA axis suppresses some immune activity through the production of oxytocin.
of cortisol, which has an anti-inflammatory effect and reduces both the number of white blood cells and the release of cytokines (see Chapter 11).

Different types of stressors make different demands on the body, and the immune response to stress has developed to reflect this. A review and meta-analysis of over 300 studies of stress and immunity showed that immune responses vary according to whether the stressor is acute (lasting a few minutes), a brief naturalistic stressor, a sequence of stressors, or a chronic long-term stressor (Segerstrom & Miller, 2004). Short stressors, such as giving a presentation, lead to an acute increased immune response and redistribution of cells to provide an immediate defence against injuries and the broad risk of infection. This response is very rapid and the immune system quickly returns to baseline levels. Brief stressors that continue for several days, such as studying for exams, have a different effect on the immune system and influence the function of the immune system with a switch away from cellular immunity, which protects against injury or damage, to humoral immunity, which protects against infection. This means the body will be more able to coordinate responses against infections: it might explain why students often get sick after exams – because during the stressful revision period they have increased immunity against infections which largely disappears when exams are over. The research on stressful sequences of events has largely looked at bereavement and trauma and these events are associated with different immune responses. Chronic stressors, such as caring for a relative with dementia or unemployment, have a negative impact on almost all aspects of immune functioning, with poorer immune function overall. This makes a person more likely to get ill, particularly if they are already vulnerable (e.g. elderly people) or have pre-existing disease (Segerstrom & Miller, 2004).

**ACTIVITY 3.1**

- Can you remember how many stressful events you have been through in the last year?
- How accurate do you think you can be? Are there things you might have forgotten?
- What do you think affects whether you remember stressful events or not?

### 3.1.3 STRESS AS A PERSON–ENVIRONMENT INTERACTION

It is now widely accepted that how we respond to stressors depends on the interaction between a person and their environment. Interactional or transactional explanations of stress provide a more complete account of the different processes involved in stress. This approach argues that stress occurs when a person appraises the demands of a situation as being greater than their ability to cope with these demands (Lazarus & Folkman, 1984). Appraisal processes are central and explain why there is so much variation in how different people respond to stressors.
The interactional approach outlines three processes of appraisal:

1. **Primary appraisal**: the demands of a situation are evaluated as benign or stressful (i.e. challenging, threatening, or potentially involving harm or loss).
2. **Secondary appraisal**: a person evaluates their resources and capacity to cope.
3. **Reappraisal**: after applying a coping strategy (or strategies) a person reconsiders the situation. This may lead to reappraisal of a stressor as less or more stressful than originally thought, depending on the effect of their coping responses.

There is a wealth of evidence for the importance of appraisal in how we respond to stressors. A meta-analysis of 81 studies of people with chronic pain or who had pain induced in laboratory experiments showed that in both these situations appraisals of pain as threatening were associated with greater pain, reduced tolerance of pain, and more passive coping. In people with chronic pain, appraisal of the pain as threatening was also associated with more impairment and psychological distress. In contrast, appraisals of pain as challenging were associated with more pain tolerance and active coping (Jackson et al., 2014). The importance of primary appraisal is illustrated throughout this book (see, for example, the discussion in Chapter 2 of responses to discovering a breast lump). Box 3.2 gives examples of primary and secondary appraisal, and reappraisal. A strength of the interactional approach is the recognition of the appraisal-coping-reappraisal cycle. This constant interplay between appraisal, coping, and reappraisal means stress is conceptualised as a dynamic process.

**BOX 3.2  Appraisal and stress**

<table>
<thead>
<tr>
<th>Trigger</th>
<th>Skin rash</th>
<th>Skin rash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>'It’s meningitis’ [threatening]</td>
<td>'It’s probably nothing’ [benign]</td>
</tr>
<tr>
<td>Secondary</td>
<td>'I can’t cope with this on my own’</td>
<td>'I’ll just leave it’</td>
</tr>
<tr>
<td>Feelings</td>
<td>Stressed</td>
<td>Calm</td>
</tr>
<tr>
<td>Coping</td>
<td>Visit doctor – find out it’s eczema</td>
<td>Keep an eye on it</td>
</tr>
<tr>
<td>Reappraisal</td>
<td>'The cream the doctor gave me should make it better’ [can cope]</td>
<td>'It doesn’t seem to be getting worse so I’ll wait a bit longer’</td>
</tr>
<tr>
<td>Feelings</td>
<td>Calm</td>
<td>Calm</td>
</tr>
</tbody>
</table>
The interactional model as originally proposed is not without problems but elements of it are now widely accepted, such as the importance of the interaction between the person and environment, the central role of appraisal, and that coping and other psychosocial factors moderate how we respond to stressors. A biopsychosocial approach to stress incorporates all these elements and is illustrated in Figure 3.3.

**Summary**

- The stress process involves (a) stressors and (b) stress responses.
- Stress responses include physiological, behavioural, emotional, and cognitive changes.
- Stress occurs when the perceived demands of a situation are appraised as exceeding a person's perceived resources and ability to cope (individually or with social support).
- Appraisal is therefore central to whether a person feels stressed or not.
- Physical stress responses involve the sympathetic nervous system, HPA axis, and immunological changes.
- The flight-flight response is not the only biobehavioural response to stressors. The tend-befriend response is an affiliative response to stressors which is more common in females and underpinned by oxytocin and endogenous opioids.
- Physical stress responses vary according to the characteristics of the stressor, for example, novelty, predictability, and control.
- Individuals vary in the strength and nature of their physical responses to stressors (stress responsivity).
3.2 STRESS AND HEALTH

3.2.1 LINKS BETWEEN STRESS AND HEALTH

There is plenty of evidence that stress is associated with morbidity and mortality. For example, studies of bereavement show that older people are more likely to die in the year after their spouse dies than other people of the same age and health (Subramanian et al., 2008). The impact of stress on physical health varies between illnesses. There is good evidence that prolonged stress (whether measured in terms of stressors or subjective experience of stress) results in increased episodes of infectious illnesses like colds (see Research Box 3.1), cardiovascular disease, slower wound healing, and worsens autoimmune conditions such as asthma, rheumatoid arthritis, inflammatory bowel disease, and HIV/AIDS (Steptoe & Ayers, 2005). Examples of research in these areas can be found throughout Section III of this book. Similarly, the association between stress and poor mental health is well recognised. Chronic or severe stress can lead to a number of mental health problems, including anxiety, depression, stress burnout, and post-traumatic stress disorder (PTSD).

However, as with our emotions, it is difficult to establish the definitive pathways between stress and health. There are three main issues. The first is the huge variation in how people respond to stressors. Why is it that if we put two people in the same circumstances, one person becomes stressed and the other does not? Or that one person develops heart disease and another remains healthy? Some of these differences can be accounted for by differences in appraisal and stressor characteristics, as we have already seen, but the effect of stress is also influenced by many other factors, such as an individual’s resilience, coping responses, and social support.

The concept of allostasis and allostatic load is one way to explain how stress might lead to disease (McEwen, 1998a, 1998b). Allostasis refers to the process of regulating our physiological state to achieve stability, or homeostasis. This is done through physiological systems, such as the autonomic nervous system, HPA axis, neuroendocrine and immune systems, or through changing behaviour. In the short term, these changes are adaptive because they maintain physiological stability while adapting to changing external circumstances. However, frequent or chronic activation of these systems results in a high allostatic load (or strain) on the body. This cumulative allostatic load can lead to an imbalance in allostatic systems and disease. Different types of allostatic load have been proposed. A prolonged response is where physiological systems remain in a continually high state which results in long-term strain on the body. An inadequate response is where one allostatic system does not respond adequately so other systems have to overcompensate. Alternatively, if people are exposed to repeated acute stressors there can be a lack of adaptation, with repeatedly high physiological stress responses (McEwen, 1998a, 1998b). Allostatic load is usually measured by a combination of biomarkers from the cardiovascular, metabolic, immune, and neuroendocrine systems.

A review of the evidence for allostatic load shows it is associated with a range of social and environment factors associated with health, and with health disparities between certain groups. Factors associated with allostatic load include ethnicity, socioeconomic status,
**RESEARCH BOX 3.1  Stress and the common cold**

**Background**
Research shows that susceptibility to the common cold is greater when people feel stressed, but also when people have less social support. Other research suggests people with trait-like positive affect are more resilient. This study examined the interactive effects of stress, social support, and dispositional affect on susceptibility to the common cold.

**Method and findings**

694 healthy adults completed measures of perceived stress, trait positive and negative affect, and social support. They were then given a cold virus, kept in quarantine for five days and monitored for clinical illness (infection and objective symptoms of illness). Overall, 75% of participants became infected with the virus and 30% met criteria for developing a clinical cold.

Results showed that levels of perceived stress or support on their own were not associated with greater risk of catching a cold. However, emotional disposition was an important moderator. People who had negative dispositions were at greater risk of a cold if they felt stressed, regardless of their levels of social support. In contrast, people with positive dispositions were responsive to levels of support: those who felt stressed but who had high levels of support were less likely to develop a cold than those with poor support.

**Significance**

This study tests the idea that support buffers against the negative effects of perceived stress and shows that this may be moderated by emotional disposition when looking at susceptibility to the common cold (see also Chapter 2 on emotions and health). Part of the significance of this research and previous studies of this kind is in showing that perceived stress, support and emotional disposition can affect whether people catch cold viruses (through an examination of immune antibodies) and also whether they then display the symptoms of a cold (through an examination of coughs, mucus, etc.). These studies illustrate that the effect of stress is strong enough to be clinically relevant.

social relationships, gender, lifestyle factors, exposure to stressors, and genetic factors. High allostatic load is also associated with physical and mental health outcomes, and all-cause mortality (Beckie, 2012). The concept of allostatic load is therefore useful in that it provides a framework through which the interaction between the environment and individuals’ biobehavioural responses can lead to poor health outcomes. The use of combined measures from multiple physiological systems has also broadened the focus onto systemic responses to stressors and the impact of this.

However, a second issue is that it is usually not possible to say whether an illness is due (a) entirely to stress or (b) entirely to other factors (i.e. not at all to stress). Illnesses often have multiple causes, ranging from the genetic and biological to the environmental. The role of stress will also vary widely in different illnesses. A traumatic stressor may cause PTSD but only exacerbate the symptoms of asthma. The contribution of stress to illness will therefore vary widely between individuals, circumstances, and illnesses.

A third issue is that the effect of stress on health can be due to behavioural, emotional, or physical responses to stressors. For example, people who are stressed are also more likely to smoke, drink alcohol, and have a poor diet (Wardle et al., 2000). The physical response to stressors is therefore not the only pathway between stress and disease, as illustrated in the biopsychosocial approach in Figure 3.3.

### 3.2.2 VULNERABILITY AND RESILIENCE

We have already seen how some people are more vulnerable to poor health. Examples of this are ‘orchid’ children who are more responsive to adverse environments (Boyce et al., 1995), and the health disparities observed between different groups, such as people from lower socioeconomic groups. The vulnerability-stress model (sometimes called the diathesis-stress model) shown in Figure 3.4 summarises how vulnerability factors interact with stressors to influence whether someone develops disease or not.

It is also clear that some people are very resilient in the face of stressors and remain in good health despite adverse circumstances. This is illustrated by the research described earlier where ‘dandelion’ children had similar health outcomes regardless of whether they were raised in positive or adverse environments (Boyce et al., 1995). It is also clear that even in the face of significant adversity, such as chronic or terminal illness, people can adapt and find happiness and personal growth (see Chapter 6). Resilience has been classified as people showing swift recovery from stressful events, having sustainability of purpose in the face of adversity, and growth or new learning from adversity (Zautra & Reich, 2010).

Research suggests that the majority of people are resilient. For example, trauma and adversity are common and at least 50% of people will experience trauma or adversity
in their lifetime. However, the prevalence of PTSD in the general population is approximately 10%, suggesting that most people who experience a traumatic event recover (Horn et al., 2016). A review of factors associated with resilience identified those factors in Box 3.3 as important in developing resilience during childhood and remaining resilient in adulthood (Horn et al., 2016).

**BOX 3.3 Psychosocial factors associated with resilience**

<table>
<thead>
<tr>
<th>Childhood</th>
<th>Adulthood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive bonds with caregivers</td>
<td>Positive emotions, optimism</td>
</tr>
<tr>
<td>Consistent parenting</td>
<td>Active coping</td>
</tr>
<tr>
<td>Self-regulation of emotions</td>
<td>Cognitive reappraisal</td>
</tr>
<tr>
<td>Intelligence and problem-solving</td>
<td>Altruism</td>
</tr>
<tr>
<td>Mastery</td>
<td>Mastery</td>
</tr>
<tr>
<td>Positive friendships</td>
<td>Social support</td>
</tr>
<tr>
<td>Motivation for achievement</td>
<td>Facing fears</td>
</tr>
<tr>
<td>Meaning</td>
<td>Meaning, sense of purpose</td>
</tr>
</tbody>
</table>

(Adapted from Horn et al., 2016)

Here we focus on a few of the factors associated with resilience, namely (1) emotion and emotional disposition, (2) ways of coping, and (3) social relationships and social support.
Emotion and emotional disposition

As we saw in Chapter 2, positive emotions and positive emotional dispositions have a powerful influence on health so are important in resilience. A range of positive emotional states (e.g. emotional wellbeing, positive mood, joy, happiness, vigour, energy) and positive dispositions (e.g. life satisfaction, hopefulness, optimism, sense of humour) are associated with reduced mortality in healthy people and in people with chronic illness (Chida & Steptoe, 2008). Having an optimistic disposition is associated with reduced mortality, increased survival, fewer physical symptoms, lower risk of cardiovascular disease, and improved physiological functioning (including immune function) (Rasmussen et al., 2009).

The role of negative emotions and emotional dispositions as a vulnerability factor is not as straightforward. There is now substantial evidence that some types of negative emotion are associated with specific illnesses. The main examples of this are associations between anger, hostility, depression, and cardiovascular disease (Chida & Steptoe, 2009; Fiedorowicz, 2014). Depression is a clear vulnerability factor and is associated with a wide range of morbidity and mortality. For example, depressed people are between 50% and 100% more likely to develop cardiovascular disease than healthy people (Lett et al., 2004).

The negative emotional disposition of neuroticism has also been implicated as a vulnerability factor. People high in neuroticism experience a wide range of negative emotions, such as low mood, anxiety, guilt, hostility, and fear. People high in neuroticism generally report more pain and somatic symptoms and are at greater risk of psychological disorders (Contrada & Goyal, 2005). For example, a large prospective study of 21,676 adult twins in the USA, who were followed up over 25 years, found that, after controlling for genetic vulnerability in twins, those who were high in neuroticism were significantly more likely to report musculoskeletal pain, headaches, migraine, chronic fatigue, colitis, irritable bowel syndrome, gastroesophageal reflux disease, and cardiovascular disease 25 years later (Turk et al., 2008). However, there is also no consistent link between neuroticism and measures of chronic morbidity such as heart disease, cancer, or mortality (Hielmayr & Friedman, 2017).

ACTIVITY 3.2

- Do you know anyone who gets stressed very easily?
- Which kind of factors do you think influence why they are like that?
- How much of it is due to circumstances, the person’s vulnerability or resilience, and the coping strategies they use?
Coping

As we saw earlier when looking at the interactional model of stress, coping is a vital part of how we respond to stressors. How we cope with stressors partly determines our physical and emotional responses. People who appraise an event as challenging have smaller cortisol responses than people who appraise it as threatening. Research looking at coping defines it as any attempt to cope with a stressor, irrespective of whether this is successful or not. This covers a huge range of coping actions and there has been an extensive debate over how to best conceptualise different coping strategies. Categories that are widely used distinguish between emotion-focused and problem-focused coping; or between approach and avoidant coping. Emotion-focused strategies are those that concentrate on reducing distress (e.g. not thinking about it, eliciting emotional support) whereas problem-focused strategies concentrate on dealing with the problem (e.g. information seeking, problem solving).

For healthcare practice, the distinction between approach coping and avoidant coping may be more useful. Approach coping strategies try to deal with the situation proactively, so are predominantly active strategies and share some overlap with problem-focused strategies. Avoidant coping strategies try to avoid the problem (e.g. denial, not wanting to talk about it), so are predominantly emotion-focused. The important point for healthcare practice is that a person who is predominantly an avoidant-coper may find it very difficult to discuss their illness, the side effects of treatment, or any potential complications. Conversely, an approach-coper will want to know everything about it and may come to consultations armed with extensive information gleaned from the internet!

In general, coping strategies that enable a person to feel more in control (mastery) increase positive emotions and decrease negative emotions, and are associated with resilience and better health. For example, finding meaning or benefit in adverse events is associated with resilience. A review of the literature on people with cancer showed that those who found some benefit in having cancer had better immune function (Pascoe & Edvardsson, 2013).

However, it is not always as simple as saying one coping style is better than another. Under certain circumstances avoidant or passive coping strategies may be good for reducing anxiety and distress in the short term. Before an operation this can be helpful because it keeps anxiety levels down and once the operation is over the stress is over. However, for someone with a chronic illness, avoidance can lead to a lack of adherence to treatment regimens and compound illness problems.

**ACTIVITY 3.3**

- Which kind of coping strategies do you tend to use?
- Can you think of anyone who is clearly an avoidant-coper or an approach-coper?
- How well does this coping approach work for them in different situations?
Social relationships and social support

Interpersonal relationships are vital to our quality of life and health. Negative relationships involving abuse or conflict are some of the most potent stressors. Traumatic events that involve intentional harm from another person, such as rape, assault, or torture, are much more likely to cause PTSD than natural disasters (Charuvastra & Cloitre, 2008).

Social relationships also shape the way we respond to stressors. As we have seen, early mothering influences the way young animals respond physiologically and behaviourally to stressors. In humans, social bonds are very influential in shaping a child’s stress responses. Attachment theory (see Chapter 8) proposes that babies are born with an instinct to turn to their parents or significant others when they experience stressors or are in danger. In extreme situations, such as children being abandoned or abused, children are more likely to develop insecure and chaotic responses to stressors. Parents also shape their children’s responses to stressors. Studies of parents and children exposed to the same stressor show that their responses are very similar. There is increasing evidence that anxious parents have anxious children, and that having a controlling parenting style is a strong moderator of this (van der Bruggen et al., 2008). It has also been shown that interventions designed to promote positive parenting improve resilience in children (Wolchik et al., 2002).

It is well established that social relationships are associated with improved health outcomes in both healthy people and those with chronic diseases. A review and meta-analysis of over 300,000 people showed that having stronger social relationships is associated with a 50% increase in survival rates (Holt-Lunstad et al., 2010). This is comparable or greater than other well-known risk factors, such as smoking, exercise, and hypertension (Uchino et al., 2017). Conversely, loneliness, social isolation, and living alone are associated with a 26–32% increased risk of premature mortality (Holt-Lunstad et al., 2015).

However, although there is extensive evidence about the importance of social networks and relationships, the impact of an act of support on perceived stress is more complex. Laboratory experiments that induce stress by asking people to undertake social speaking or hard arithmetic tasks show that having someone present can reduce SNS and HPA axis responses, although this is not consistent and varies according to factors such as culture, gender, and the nature of the relationship (Hennessy et al., 2009; see Research Box 3.2). The same effect (and variation in this) has also been observed with pets being present (Schreiner, 2016).

Thus, social relationships are critical to health. Having a strong support network and relationships has a direct positive impact on health and being socially isolated has a direct negative impact on health. Receiving support during a stressful event can buffer against the effects of stress, but this is affected by a number of factors. Individual and cultural differences in how support is interpreted are illustrated in Research Box 3.2. Some have therefore argued that the effect of support on health is due to knowing that other people are close and available to support us should we need it, rather than due to actual support received during stressful events (Taylor, 2010).
RESEARCH BOX 3.2  Interpreting a helping hand: cultural variation in the effectiveness of social support

Background
Support is associated with better health outcomes but there are cultural differences in how people perceive and respond to support.

Method and findings
This study investigated whether the way in which support is offered affects how people respond to stressors. It examined stress responses in adults from an individualistic culture (European Americans) or collectivistic culture (Asian Americans).

An experiment was conducted where people were given a stressful mathematical task to do with another person in the room. They were told that this person was a mathematics major. In one condition, the maths major gave the participant help and support without the participant having to ask for it (unsolicited support). In another condition, the participant had to ask for support (solicited support). 70 people took part in the experiment (38 Asian Americans and 32 European Americans).

Participants from the collectivistic culture (Asian Americans) were less likely to ask for support. They also found the task more stressful when they had to ask for support, as opposed to it being given automatically. In contrast, participants from the individualistic culture (European Americans) did not rate the task as any more or less stressful if they had to ask for support compared to receiving it automatically. Further analysis suggested that this effect of culture might be due to performance self-esteem, which was higher in European Americans.

Significance
This study demonstrates that the way in which support is offered can impact on perceived stress for people from different cultural backgrounds. If people from collectivistic cultures have to ask for help, they may experience this as more stressful. This has implications in healthcare settings where we support people in difficult health circumstances.

CLINICAL NOTES 3.2

Coping styles and clinical practice

- Consider people’s coping styles when giving information in clinical practice.
- People with avoidant coping styles may not want information and may become anxious or distressed if given information.
- Conversely, people with approach coping styles will want information and may become distressed if not given information.
- Social relationships are critical to wellbeing so it is important to identify people who are socially isolated and encourage or help them to increase their support networks.
- Providing support can buffer against the effects of stressors but this varies according to how the individual interprets such support.

Summary

- Severe or chronic stressors are associated with a range of morbidity and mortality.
- Variability in how we respond to stressors makes it difficult to establish causal pathways between stress and disease.
- A vulnerability-stress approach explains how stress may interact with an existing vulnerability to affect health.
- Most people are resilient to stressors.
- Resilience in adulthood is influenced by positive emotions and emotional dispositions, coping, and social relationships and support.
- Interpersonal relationships and social support are critical and shape how we respond to stressors and, in some cases, can buffer against the negative impact of stress.

3.3 STRESS IN MEDICINE AND HEALTHCARE

Working in healthcare and medicine is inherently stressful: it involves dealing with health crises and distressed people, and it may entail making life and death decisions. As we have already seen, stress is associated with negative psychological states, including anxiety, depression, burnout, and PTSD. Stress burnout has three main symptoms:

1. **Emotional exhaustion**: feelings of physical exhaustion, being depleted, worn out.
2. **Depersonalisation**: having an unfeeling, impersonal approach to co-workers or patients, cynicism, and a lack of engagement with the job or people.
3. **Reduced personal accomplishment**: a poor sense of effectiveness, involvement, commitment and engagement, and a poor belief in one’s ability to change or improve work patterns or environment.
Burnout can be conceptualised on a continuum from work engagement to burnout. Engagement is characterised by high levels of vigour, dedication, and absorption, and is associated with good performance (Montgomery & Maslach, 2017). Burnout is associated with poor performance, high job dissatisfaction, absenteeism, and staff turnover. In addition, symptoms of exhaustion are associated with many other physical symptoms, such as headaches, gastrointestinal disorders, hypertension, colds or flu, and sleep disturbances (Leiter & Maslach, 2000).

Burnout is a particular problem for doctors, nurses, and student healthcare professionals. Rates of burnout among doctors are between 25% and 60% (Goitein et al., 2005), and can even be as high as 75% (Fahrenkopf et al., 2008; Shanafelt et al., 2002). Burnout is also high in nurses with 33–50% being affected (Imai et al., 2004; Poncet et al., 2007). One European survey of family doctors in 12 countries found high levels of burnout were associated with poor job satisfaction, intention to change job, sick leave, younger age, being male, and use of alcohol, tobacco, and psychotropic medication. Burnout also varied according to country and region (Soler et al., 2008). A meta-analysis of burnout in over 28,000 doctors also found differences between countries, with doctors in the USA having lower levels of emotional exhaustion than those in Europe. In the USA, burnout was associated with work–life conflict and poor coping strategies, whereas in Europe burnout was associated with negative attitudes to work (Lee et al., 2013). Lifestyle and health behaviours are also affected: a study of burnout in seven European countries found that burnout led to more fast-food consumption, less exercise, and greater use of alcohol and painkiller use. These associations remained even after controlling for individual differences and country of residence (Alexandrova-Karamanova et al., 2016).

Risk of burnout operates at three levels: individual (healthy lifestyle/behaviours, adequate coping), the individual and the environment (social support structures, relationships, improving person–organisation fit), and at the organisational level (adequate working conditions, organisation of work, design). Interventions to prevent burnout should therefore be aimed at all three levels. However, although there is evidence for individual risk factors for burnout, there is more substantial evidence for the importance of organisational risk factors (Montgomery & Maslach, 2017). The six main organisational factors associated with burnout are shown in Box 3.4. Ways to change these to engender a positive organisational culture and staff engagement have also been proposed. There is some evidence that interventions such as Civility, Respect and Engagement in the Workplace (CREW)
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(CREW) promote change and a work culture that is more empowering for staff (Spence Laschinger et al., 2012).

BOX 3.4  Workplace and burnout

Evidence suggests that burnout is more likely in jobs that involve:

- A high workload.
- A lack of control.
- Insufficient rewards.
- An absence of fairness.
- Value conflicts.
- A poor sense of community.

(Source: Leiter & Maslach, 2004)

Students training in medicine and other healthcare professions also face many stressors. These include keeping up with coursework and exams; dealing with death, suffering, and difficult ethical issues; performing intimate examinations of others at a young age; and demanding work hours. Longitudinal studies that have followed medical students over a number of years have identified some characteristics that are associated with stress and burnout later in life. Medical students who are disorganised, have poor time management, feel overwhelmed, and who are unsure of the demands of different tasks are more likely to report stress and burnout in their 30s (McManus et al., 2004). Students who are self-critical, neurotic, perfectionists, report feeling like an ‘imposter’, and if they are female are also more likely to suffer from stress and burnout later in their career (Firth-Cozens, 2001). Learning positive ways to manage stress is therefore extremely important for healthcare professionals. These include using appropriate support and learning positive stress management techniques. Case Study 3.1 shows how the interactional model of stress can be used to help a student cope with exam stress.

3.4 MANAGING STRESS

Understanding the processes of stress provides a basis for helping people manage stress more effectively.

Most stress management interventions aim to reduce arousal and build coping skills so the person is able to manage stress better. There are many different approaches to stress management which can broadly be divided into two main categories: (1) those that focus on physical and mental relaxation, such as relaxation exercises, meditation, mindfulness, and yoga; and (2) those that focus on cognition and behaviour, such as psychoeducation,
CASE STUDY 3.1 Managing stress in medicine and healthcare

Isha is a medical student approaching the end of her first year. Before medical school Isha was a straight-A student. At medical school her results have varied. She has passed everything but has lost confidence. She is particularly worried about the Clinical Examinations where she has to demonstrate clinical skills with a patient in front of an examiner. Isha is very anxious and not coping well. She is convinced she is going to freeze up, look stupid in front of the examiner, and fail the exam.

Isha finds the constant examinations and evaluation of medical school really hard. She feels tired, tense, and is finding it difficult to concentrate on her studies. She is beginning to doubt whether medicine is the right career for her.

Stress management

Stress management involves education about stress and coping, exploring each person’s unique way of dealing with stressors, and facilitating more adaptive coping. When based on the interactional model, stress management looks at demands, appraisal, resources, and coping as follows:

Demands

The demands of medical school on Isha may be explored in order to make them explicit. For example:

- What are the triggers to this situation? e.g. clinical examinations.
- What demands does it place on Isha? The exams make Isha feel evaluated, not good enough, and she has lost confidence.
- How real are these demands? Are they based on fact or Isha’s fears?

Appraisal

This stage would look at her appraisals and how they are affecting her feelings and coping, such as:

- When she is feeling unable to cope, what thoughts are going through her head? This would emphasise the role of appraisal in how Isha feels. Current appraisals include: ‘I am going to fail’, ‘I will freeze up and look stupid’, ‘Maybe medicine isn’t right for me’.
- How could she think differently to help her feel and cope better? This would highlight appraisals and coping strategies that might be more adaptive: ‘Exams are hard but I

(Continued)
have got through them before’, ‘It’s not only me that finds exams hard’, ‘If I freeze up it’s not the end of the world’, etc.

Resources to cope
This stage would involve exploring with Isha which resources she can use to cope. This includes helping her to learn new coping strategies and to draw on existing ones. For example:

- What support is available? Including other students, teachers, friends, family, and healthcare professionals. How can she use this now?
- How has she coped with difficult situations in the past? This would raise awareness of which coping strategies are available to her.
- What worked and what didn’t work? This would help Isha realise what are adaptive and maladaptive coping strategies in different situations.
- How can she use these strategies to cope now? This could help Isha realise she has resources to cope and should reduce her feelings of helplessness, increase her confidence, and encourage her to use strategies that will help her feel better.
- What new coping strategies might help her now? This encourages Isha to learn and use new ways of coping.

Managing stress
Drawing on the previous stages, you can explore practical steps and strategies to help Isha manage her exam preparation now and in the future. To some extent this is very individual. For example, Isha might realise that talking to other students really helps because it normalises a certain amount of anxiety and worry. She might find that working with a group of students to revise and practise together boosts her confidence. Or she might realise that in a previous stressful situation she was able to think about it differently and ‘talk’ herself out of her fears.

cognitive restructuring, assertiveness training, and stress inoculation. More information about relaxation, mindfulness, and cognitive behaviour therapy (CBT) is given in Chapter 19. Interventions such as stress inoculation are based on exposing people to potential stressors and training them in skills (e.g. skills drills) so they become ‘inoculated’ against these stressors and are able to work effectively under potentially stressful conditions. For example, paramedic training will often include rehearsals or ‘mock ups’ of major road traffic accidents in order that when paramedics are in a real accident situation they are equipped with the right knowledge and actions to deal with it effectively.

Building resilience is frequently suggested as a preventative strategy against burnout among doctors and healthcare professionals. This is a broad approach that can draw on
many of the techniques above to help an individual cope better with stress and recover quicker. A qualitative study of physicians in Canada found resilience was a dynamic, evolving process of positive attitudes and effective coping strategies. Four main aspects of resilience in these physicians were: (1) attitudes and perspectives, which included valuing the physician role, maintaining interest, developing self-awareness, and accepting personal limitations; (2) balance and prioritisation, which included setting limits, taking effective approaches to continuing professional development, and honouring the self; (3) practice management style, which included sound business management, having good staff, and using effective practice arrangements; and (4) supportive relations, which included positive personal relationships, effective professional relationships, and good communication (Jensen et al., 2008).

Cognitive-behavioural stress management programmes focus on appraisals and coping responses to help people manage stressors and perceived stress better. These can be useful to assist people who are coping with illness. Stress management techniques have therefore been widely implemented and evaluated for people with cardiovascular disease, cancer, and chronic headaches – but with mixed results. The evidence suggests that stress management has positive effects on psychological outcomes, such as reducing depression and increasing self-esteem, but the impact on physical morbidity or mortality is mixed. Early studies showed stress management programmes led to decreased mortality from heart disease (Friedman et al., 1986) and cancer (Spiegel et al., 1989). However, research since then has failed to replicate this effect. For example, a Cochrane review of 148 studies of cardiac rehabilitation found that psychological and educational interventions have little or no impact on morbidity or mortality but can improve quality of life (Anderson & Taylor, 2014).

One particular type of stress management programme, called critical incident debriefing, has proved controversial. Debriefing was initially developed to help people deal with very stressful or traumatic events and prevent the development of PTSD. Debriefing programmes vary but they usually involve one session within four weeks of the event, during which a person is encouraged to talk about their thoughts and feelings during the event and their symptoms since the event. The therapist will then educate the person about responses to traumatic events, in an attempt to normalise these experiences. A number of studies have shown that debriefing has little effect on symptoms of PTSD or depression, and one study of using debriefing with people with burns found it made them worse (Bisson et al., 1997). Some clinical guidelines therefore explicitly recommend against using debriefing interventions as a treatment after traumatic events (National Institute for Clinical Excellence (NICE), 2005).

Interventions to prevent work stressors and perceived stress in healthcare professionals have mixed results. Some interventions have good results in particular settings. For example, an intensive training programme for oncology nurses to help improve attitudes, communication skills, and reduce perceived stress led to nurses having better communication skills with patients, reporting less stress, and patients being more satisfied with their care (Delvaux et al., 2004). Another review of mindfulness interventions to help nurses cope with stressors and perceived stress found it led to improved wellbeing,
reduced anxiety and depression, and improved performance at work (Guillaumie et al., 2016). However, reviews that look at multiple interventions across multiple settings generally find more moderate effects. A Cochrane review of interventions aimed at preventing stress in healthcare workers concluded there is moderate evidence that physical and mental relaxation exercises and CBT reduce work stress compared to no intervention, but that relaxation and CBT interventions are similar in their efficacy (Ruotsalainen et al., 2015).

**CONCLUSION**

It is clear that we need to take a more sophisticated approach than thinking there is a simple dose–response relationship between stress and illness. As we saw in Chapter 2 on emotion, some negative emotions, such as depression and anger, are associated with illnesses such as heart disease. However, as this chapter on stress has shown, we need to account for individual differences in many factors, including a pre-existing vulnerability and resilience, exposure, health behaviour, and social and environmental factors in determining whether a person will become ill and the type of illness they may suffer.

In the last two chapters we have concentrated on the effects of motivation, emotion, and stress on health. In trying to explain the mechanisms underlying the association between emotion, stress, and health we have primarily concentrated on physical and behavioural pathways. However, emotion and stress will also influence symptom perception, help-seeking, and illness behaviour. In the next chapter we examine the role of symptom perception and illness beliefs in more detail.

**CLINICAL NOTES 3.3**

**Looking after yourself**

- Studying and working in healthcare can be very stressful. It is therefore really important that you are aware of your own stress levels and take steps to look after yourself.
- Recognise the signs and symptoms of stress in yourself and take steps to manage your stress.
- Avoid trying to ‘go it alone’. Use formal and informal support available to you, such as student counsellors (at university) and colleagues (in practice). Some areas have groups where healthcare professionals can talk through stressful or difficult issues in healthcare practice (e.g. www.balint.co.uk).
- If you have symptoms of burnout or other psychological problems, then get help as soon as possible, before the problem becomes chronic or severe.
- Skills in organisation, time management, and finding positive ways of dealing with stressors are worth developing early on in your career.
- Perfectionism and self-criticism will increase the stress you put on yourself.
Summary

- Severe or chronic stress is associated with psychological problems such as anxiety, depression, stress burnout, and PTSD.
- Burnout occurs when people feel exhausted, depersonalised, and have a poor sense of personal accomplishment.
- Health professionals are at increased risk of burnout and stress-related psychological problems, particularly in demanding specialties such as intensive and palliative care.
- Understanding stress processes is important to develop interventions that help people manage stressors more effectively.
- Stress management interventions are generally associated with increased psychological wellbeing, but evidence of their effect on physical health is mixed.

FURTHER READING


REVISION QUESTIONS

1. How is stress defined in psychology?
2. Outline the different elements of the interactional model of stress.
3. Describe the physiological responses to stress.
4. What factors are important in the variation in how we respond physiologically to stress?
5. Outline the vulnerability-stress explanation of how stress influences health.
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6. Discuss four factors that moderate the effect of stress on health.

7. Define ‘coping’ and describe two different ways in which coping strategies have been classified.

8. Outline the evidence that social support affects health.

9. What is stress burnout and how does it affect healthcare professionals?

10. Describe two types of stress management interventions and briefly discuss the evidence that they are effective.