

HEALTH PSYCHOLOGY

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4

The Stress Process

THE MOST PREDICTABLE THING ABOUT STRESSORS IS THAT THEY'RE UNPREDICTABLE

Although there are few certainties in life, we can pretty well count on meeting all sorts of stressful events. They can be isolated incidents, or they might occur in threes, sixes or twelves, perhaps becoming chronic and intractable, seemingly going on forever. Some will appear as social stressors involving family or friends, whereas others might involve financial strains or problems with health. What's also fairly certain is that events interpreted as stressful by one person might not be similarly appraised by a second, and even if they were viewed in the same way, entirely different methods might be used to cope.

There's yet another certainty concerning stressors. Specifically, there's no shortage of experts on the topic, offering strategies to diminish your feelings of distress. Massage, acupuncture, yoga, relaxation therapy, deep breathing, meditation, herbals, chiropractic, time management, exercise, pet therapy, music, cognitive therapy, mindfulness, anti-anxiety meds, antidepressants, spirituality, Tai chi, and chai tea. There's also advice offered through magazines written by some person who claims that stress can be relieved in just 10 minutes through 'being present' (I'm not sure what this even means). There are certainly some beneficial ways of dealing with stressors, but there's clearly an awful lot of cow-paddy as well.

In fact, there isn't any single best way of dealing with all stressors. Effective ways of coping vary across situations and over time, and just as a lot of frogs might need to be kissed before meeting Prince (or Princess) Charming, trying more than a single strategy might be necessary to beat the effects of stressors. More than anything, individuals need to be flexible in relation to how they deal with challenges, and they ought to be prepared to seek help.

DEFINING STRESS AND MODERATING FACTORS

What is it that makes some stressors more aversive than others, and what are the factors that make them so difficult to deal with? Why is it that we differ so broadly in how stressors affect us? What are some of the consequences of stressors on our psychological and physical well-being, and how

do these come about? I've previously written about these topics in considerable detail (Anisman, 2014), and so only an abbreviated version is provided here. In this chapter we'll consider several of these questions, focusing on:

- the characteristics of stressors that make them more or less aversive
- how we appraise stressors
- how our appraisals (and misappraisals) come to affect coping efforts
- individual factors, such as age, sex, personality, that alter the way stressors are perceived or dealt with
- the short- and long-term consequences of stressors, as well as the source for intergenerational effects of collective trauma.

ATTRIBUTES AND DIMENSIONS OF STRESSORS

Stressor, stress, and distress

In assessing the consequences of stressors on health, we need to consider several characteristics of stressful events that make them seem more or less aversive than others. So that we're all working from the same playbook, let's first define a few terms. '*Stressor*' refers to a stimulus or event that is appraised as being negative. The *stress response*, often just referred to as '*stress*', is an outcome that can be reflected by emotional, behavioral, or biological changes that occur in response to a stressor, possibly in an effort to deal with it. The term '*distress*' will be used to refer to biological and psychological states or responses that develop as a result of the stressor becoming overwhelming or failure to deal with or adapt to it effectively.

Psychogenic and neurogenic stressors

There are an astounding number of different stressful experiences that can be encountered, each with their own unique features and consequences. In general, we can divide these as falling into several categories. *Processive* stressors, which involve cognitive (information) processing, may comprise *psychogenic* stressors, referring to those that are of a psychological origin (e.g., loss of a loved one, public humiliation), or *neurogenic* stressors that are of a physical nature (e.g., burns, cancer-related pain). Not surprisingly, psychogenic and neurogenic stressors will often have different behavioral and emotional consequences and will differentially influence brain neuronal processes, and as a result they can have important implications in the treatment of pathological conditions (Merali et al., 2004).

Stressors that involve interpersonal events, such as the death of a loved one or family problems, might promote responses that are distinct from those involving achievement-related adverse events, such as school- or business-related problems (Mazure et al., 2000). Moreover, whereas social stressors may have more profound effects in women than in men, job strain and competition may have greater consequences in men, and women may be more likely to encounter stressors than are men (Kendler et al., 2001). Unlike despair, which might arise owing to stressful events that have already occurred (e.g., loss of some sort), stressors that are anticipated (e.g., the dread of seeing

the bully in the schoolyard, anticipation of imminent surgery) are more likely to be accompanied by anxiety (Harkness, 2008). Still, other anticipatory stressors, especially if they are ambiguous in nature (e.g., the pilot of your plane announcing that ‘we have to return to the airport’ without further explanation) might be accompanied by heightened anxiety and vigilance, as well as disorganized cognitions while the situation plays out. Some stressors involve an evaluative component (e.g., where individuals are appraised, as in the case of public speaking or experiencing a job interview), or a social component (e.g., a falling-out with your best friend), which elicits strong emotional responses, such as feelings of shame, and they may be particularly apt to cause neurobiological changes (Dickerson & Kemeny, 2004). Although the effects of many stressors are fairly transient, those that instigate shame and public humiliation may be remarkably powerful, engendering life-long negative consequences (Robinaugh & McNally, 2010).

Systemic stressors

We are consciously aware of most stressors encountered, although subtle cues, especially those associated with previously experienced stressors, may have effects even if they seem to go unnoticed. Psychogenic and neurogenic stressors are all in some sense tangible (i.e., we can detect them physically or psychologically), but we can also encounter *systemic* stressors of which we’re unaware, such as the presence of bacterial or viral challenges as well as disturbances of gut microbiota (intestinal bacteria). These challenges can influence brain neurochemical processes much like processive stressors do, and may be instrumental in promoting mood disorders related to anxiety and depression (Anisman et al., 2008). Unlike psychogenic and neurogenic stressors, which permit the opportunity for us to deal with them in some fashion, systemic stressors can behave like silent, insidious marauders that surreptitiously disturb physical and psychological health.

STRESSOR APPRAISALS

Primary and secondary appraisals

One of the fundamental views concerning stress processes, as described in Figure 4.1, links appraisal of stressful events to how we cope with these challenges, and how these influence well-being (Lazarus & Folkman, 1984). Appraisals of stressors vary considerably across individuals. By example, two individuals required to update their computer skills in a week-long set of lectures may have very different perspectives. One might see this as a chore that will cost them time away from their job, whereas the other might see this as a challenge in which a small investment of time will allow for considerable gains later on. These different appraisals might have been influenced by previous experiences in dealing with both similar and dissimilar events. Alternatively, they might have been the product of the individual’s specific beliefs, self-perceived abilities, as well as personality dimensions related to self-efficacy, intolerance for uncertainty, hardiness, optimism, trait negative/positive affect, and extraversion and neuroticism (Anisman & Matheson, 2005; Hemenover & Dienstbier, 1996). When appraisals comprise a threat of harm/loss, negative emotions such as anxiety or anger may ensue, whereas appraisals that entail challenge and opportunity may elicit positive emotions, such as exhilaration and eagerness, and hence positive well-being.

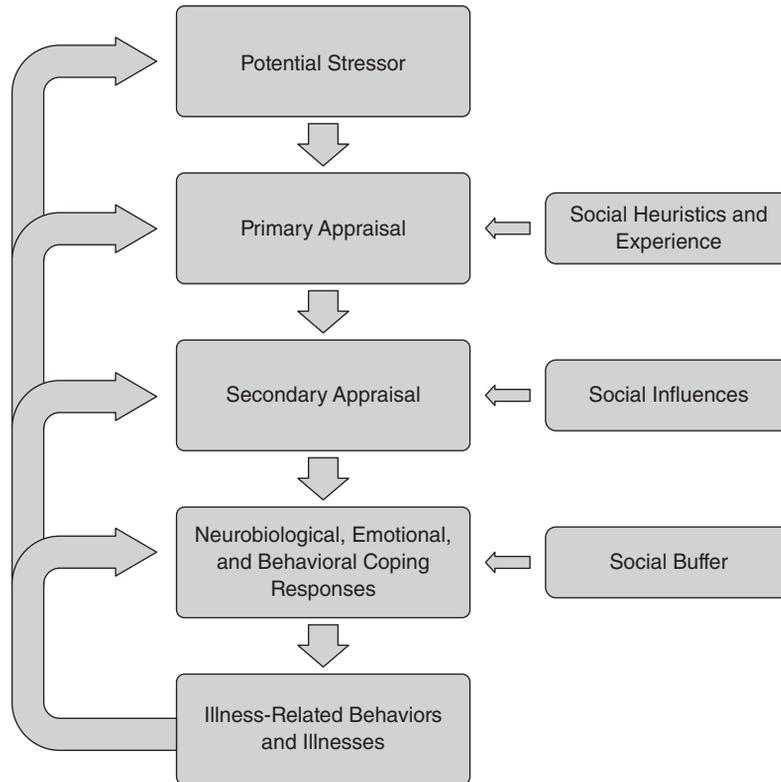


Figure 4.1 When we first encounter a novel, potentially stressful event, we make a primary appraisal of this event or stimulus, asking whether it represents a threat or risk to our well-being. We might then make a secondary appraisal, and consider whether we have the coping resources necessary to meet the demands placed on us. Once we know where we stand, we will endorse specific coping responses to deal with the challenge. At most steps along this process, social factors may influence appraisals or coping. Social heuristics (simplified appraisals based on experiences) can alter the way we initially appraise an event, and social influences can alter the secondary appraisals that are made. Likewise, social buffers (social coping) can influence the adoption of other coping methods. If individuals are able to make accurate appraisals and enlist effective methods of coping, stressor-related problems ought to be relatively limited. In contrast, making appraisal errors or adopting poor coping methods may favor the development of pathological conditions.

Appraisals, misappraisals, and heuristics

In a series of papers, Kahneman and Tversky (e.g., Kahneman & Tversky, 1996; Tversky & Kahneman, 1974) proposed a theoretical model related to decision making that has considerable significance regarding stressor appraisals. Fundamental to their model is that decisions are often made on the basis of information that is easily accessed as a result of earlier experiences or by

previously established rules or shortcuts (*heuristics*). These strategies or shortcuts are influenced by several factors that comprise associative coherence, attribute substitution, and processing fluency. *Associative coherence* refers to the stimulus or event being consistent with our preconceived or *primed* ‘intuitions’. Specifically, based on previous experiences or perhaps things we’ve heard in the past, we might form particular expectancies about a person or an event, which then influence our later appraisals. The second component, *attribute substitution*, means that when we have made a judgment about something, we might form further unconscious attributes about this stimulus. By example, if I have the impression that Rebecca is a charitable person, even though I know absolutely nothing more about her, I might also believe that she is kind, warm, and easy to get along with. The third element, *processing fluency*, refers to our subjective impression concerning the relative ease/difficulty associated with a particular appraisal – the easier it is to make a particular judgment, the more likely it is that it will be adopted.

PRIMES AND ANCHORS IN APPRAISALS AND DECISION MAKING

The view was offered that dual systems operate in making decisions; an automatic or Fast Thinking system (System 1) and a more cognitively based, Slow Thinking system (System 2) (Kahneman, 2011). The automatic, fast thinking system is ‘primed’ to react in a particular way in response to environmental events in decision-making situations. Our previous experiences, or even things we had been told about, can prime us to react in a particular way and might be especially important in stressful situations that call for fast responses. But, when relatively complex decisions need to be made, the cognitively-oriented slow thinking System 2 is called upon, possibly to override the fast System 1 responses that would otherwise be adopted (thereby precluding blunders).

We often find ourselves in ambiguous situations and we might lack the knowledge or experience to make proper appraisals that are necessary for appropriate decisions. This might entail something as straightforward as buying a used car, but you haven’t got a clue about cars or what to offer. Alternatively, a government agency pronounces that the risk of illness stemming from a particular virus is high, but given your lack of knowledge on the topic you might be uncertain regarding what actions to take. To guide our decision making, we often look for ‘anchors’ that we can use to help us appraise the situation and make decisions. These anchors might comprise the asking price for a car or it might amount to something as prosaic as something that ‘some guy said’ or perhaps on what your friends or others are doing (social comparisons).

Unfortunately, even under excellent conditions, our appraisals aren’t always accurate, and when we’re stressed our ability to make proper appraisals may be compromised. Likewise, when our mood is bad, our appraisals of a situation are more likely to be negative, and, conversely, when things are generally going well and our spirits are up, our appraisals will be positive, and even situations that are patently negative might appear manageable. Essentially, the ways we appraise events are not only influenced by past experiences and by the anchors that are currently available, but, for better or worse, they can also be colored by our current mood.

CHARACTERISTICS OF STRESSORS

Stressful experiences can differ from one another across multiple dimensions, and their impact may be related to several of its characteristics. Most obviously, the consequences of a stressor will be related to its perceived severity, so that, other things being equal, the worse the stressor is perceived to be, the greater the negative impact it can have on well-being. However, it's not just severe stressors that can have negative repercussions, as even day-to-day minor stressors can have damaging effects. There are also instances in which stressors can have positive effects, producing an activating effect so that we can deal better with what's in front of us. The anxiety present before a public performance, provided that it is within a manageable range, may favor better outcomes. It is also the case that modest stressors can be instrumental in children learning how to cope with challenges and thus diminish the negative consequences of stressors that might subsequently be met (Katz et al., 2009).

To be sure, different stressors may have effects that vary appreciably, and it's difficult to make comparisons between different types of stressful events. Is loss of a loved one more stressful than experiencing a severe debilitating illness? Is financial loss more distressing than daily public humiliation? Each is terribly aversive and each is uniquely terrible in its own way, and there is little point in suggesting that one is worse than the next. As the saying goes, 'at night all black cows look alike'. Still, there are several fundamental principles that may be considered in predicting the types of event that can lead to more or less negative outcomes.

WORRYING: THE MIND NEVER RESTS

Some people just generally seem to think negatively, often being worriers or ruminators, whereas others are more likely to put a positive spin on events. The brain's responses to events among these two types of individuals seem to be quite different from one another. When participants were shown a negative image (a masked man holding a knife to a woman's throat) but asked to put a positive spin on the situation, the worriers tended to be less able to do this and brain imaging indicated a worsening of their negativity. It seems that negativity is an inherent characteristic that is difficult to change, and attempts at forced reappraisals can have counterproductive consequences (Moser et al., 2014). There are ways of changing negative thinking (e.g., cognitive behavioral therapy), but simply telling your distressed buddy "hey, think positively" probably won't be helpful.

It is understandable that the arousal, anxiety, and worry (and the neurochemical changes that accompany these emotions) are often taken in a pejorative sense. Yet, these emotions and the accompanying neurobiological changes may be highly adaptive, keeping individuals vigilant and ready to respond should a stressful situation escalate. These emotions become problematic primarily if a persistent state of arousal develops, possibly as a result of the belief that a threat is imminent all or most of the time, and might thus confer increased illness vulnerability (Hemenover & Dienstbier, 1996; McEwen & Morrison, 2013).

Stressor controllability

Among the most important attributes of stressors that make them more or less aversive concerns their controllability. It had been suggested that when animals experienced stressful events over which they had no control, cognitive changes emerged that impaired later performance in situations where they were required to escape from aversive stimuli (Maier & Seligman, 1976). These animals were thought to have learned that “nothing I do matters”, essentially developing a cognitive schema of ‘*helplessness*’, and in subsequent behavioral tests, even when escape from a stressor was possible, they failed to make attempts at controlling their own destinies. The impact of the initial uncontrollable stressor experience disturbed the animal’s capacity to perform well in diverse situations, impaired new learning, diminished the animal’s capacity to gain pleasure in tests where animals were required to work for rewards, and elicited a behavioral profile reminiscent of depression (Zacharko & Anisman, 1991). If, however, animals first learned that control over events was possible, they were *immunized* against the effects of subsequent uncontrollable stressor experiences so that behavioral disturbances were not apparent (Seligman et al., 1975). The clinical application of such findings is consistent with the view that if individuals first develop the mindset that they could control their destiny, they might be immunized against the adverse consequences of subsequently encountered uncontrollable events.

Studies initially conducted with animals gave rise to the notion that stressor controllability was pertinent to the development of human pathologies, including depression (Abramson et al., 1978; Alloy et al., 2008) and illnesses that might be comorbid with mood disorders. However, it was not universally accepted that these outcomes were due to cognitive changes that comprised feelings of helplessness, but instead, stemmed from a constellation of brain neurochemical changes that favored the development of behavioral deficits (Zacharko & Anisman, 1991). It could be argued that these neurochemical changes were a reflection of the helplessness engendered by uncontrollable events, but in some instances predictions based on a helplessness model don’t comfortably map onto those associated with a neurochemical explanation. As we’ll see in Chapter 5, neurochemical explanations concerning the effects of stressors have become progressively more complex and have had implications for treatment that go beyond those offered by a helplessness perspective.

Appraisals and attributions in relation to helplessness

Some people who experience stressful events succumb to illnesses, whereas others appear to be *resilient* and are able to get through the most horrid tragedies, or are able to bounce back from stress-related illnesses. So what is it that makes individuals so different, and what can this teach us in helping those who fall victim to stress-related disorders? One view, stemming from a helplessness perspective, is that the attributions and appraisals that individuals make regarding stressful events largely determine their impact (Abramson et al., 1978). It was proposed that individuals differ on three appraisal dimensions related to *locus of control* (beliefs concerning whether the outcomes of our actions are contingent on our own behaviors or factors that are outside our personal control), which can influence the development of helplessness. When individuals encounter a stressor, say failing at a particular task at school or at work, they frequently form attributions as to why this occurred. These attributions can be internal (“I’m not very good at math”) or external (“the professor made the dopest exam that had nothing to do with what he taught us”); they can be stable or unstable (“I’ve never been very good at

math and never will be” versus “I should have worked harder at math, and I’ll turn it around next time”); and they can be specific or global (“I’m not very good at math, but I have lots of other skills” versus “I’m not good at math or any other academic subjects”). Those who make negative external, stable, global attributions concerning their inabilities will develop negative expectations of what they can expect in the future, as well as develop broad feelings of inadequacy and poor self-esteem, culminating in feelings of helplessness and depression.

To be sure, the negative cognitions that lead to depression entail more than just attributions that individuals bring to particular situations, but might reflect negative appraisals and a general dysfunctional pattern of thinking (Beck & Dozois, 2011). These behavioral and cognitive styles might have arisen owing to the confluence of negative early life experiences, children’s modelling of parental cognitive styles, and negative inferential feedback that comprises the tendency to attribute negative events to stable and widespread causes (Alloy et al., 2008). Thus, while not diminishing the potential role for stressor uncontrollability in relation to pathology, the effects of stressful experiences on the evolution of many pathological conditions go beyond that of acute, uncontrollable stressful events that are able to create feelings of helplessness.

Unpredictability and uncertainty

There are some events that we can count on experiencing, although their appearance may be either predictable or *unpredictable*. At the end of each school term it is predictable that there will be an exam period, but what specific questions will appear on the exam is less predictable. There are also stressors whose occurrence is *uncertain*, meaning that we don’t know whether the event will actually occur (Will this flu that’s been going around in Asia turn into a pandemic that affects most of us?). An uncertain event can also be unpredictable in that we may not know whether it will occur, but if it does, we might not know when it will happen. In general, the stressfulness of a situation increases with its unpredictability and uncertainty (Koolhaas et al., 2011).

THE VOICE OF DOOM AND GLOOM

Individuals, especially adolescents or those of university age, are often impulsive and they also frequently have a sense of invulnerability. As naïve as their perspective might be, they seemingly behave (and believe) as though bad things might happen to others, but will be less likely to happen to them. An optimism bias of this sort doesn’t exclusively occur in younger individuals, being apparent among many people across numerous situations. Individuals seem to believe that relative to others they are at reduced odds of developing a severe illness, such as breast or prostate cancer, and that the possibility of being infected by a potential virus at some time in the future is also reduced (Taha et al., 2013, 2014). People not only had a sense of personal invulnerability, but they also believed that their close friends were less likely to contract an illness relative to the general population (‘immunity by proxy’). Yet, if individuals thought that an acquaintance or family member had contracted the illness, then their own sense of invulnerability diminished. This type of bias is common, likely contributing to the unhealthy behavior of sun worshippers and smokers who might believe that ‘it won’t happen to me’.

For a time, news reports had indicated that the Ebola virus in parts of Africa was seemingly out of control. Thousand had been infected and many had died. Projections were that many more people would become infected before things got better. A poll conducted by the Harvard School of Public Health indicated that most people in the US knew relatively little about the Ebola virus, with about two-thirds believing that Ebola spreads easily and one-third believing that there was an effective treatment for the illness. There seems to be something particularly scary about Ebola, more so than many other viral illnesses. About 40% of people thought that the virus would spread to the US, and about 26% believed that they or their family members might become sick. Ebola far away was taken far more seriously than H1N1, which was in our backyards and homes, and actually killed many more people than Ebola had.

Stressful events that are certain allow us to prepare, whereas uncertainty leaves us confused about which way to turn and we might not even be sure if we should be engaging in particular behaviors to ward off the threat (My child has spiked a fever of 103°F, but I'm not sure whether this is serious or not, so do I rush to the ER or will I look stupid doing so?). Although uncertainty usually favors the emergence of negative stress responses, as we'll discuss in Chapter 15, in the context of illness in which treatment efforts have failed to stall the fatal course of a disease, it may be possible to capitalize on uncertainty as it allows people to maintain hope, despite the likelihood of the worst coming true (Mishel, 1999).

GAMBLING WITH FATE

People differ with respect to their 'intolerance of uncertainty', a trait characteristic in which individuals typically express elevated anxiety and distress in response to uncertain stressors, and persistently seek information in an effort to obtain proper information and thus reduce uncertainty. At the other end of the spectrum are those who seem to prefer that fate simply take its course, and actually prefer not to become enmeshed in the drama. There are instances in which individuals may or may not have inherited a particular gene that might influence the odds of developing a disease. Women with a family history of breast cancer attributable to a particular gene mutation (e.g., BRCA1 or BRCA2) might be inclined to be tested to determine whether they have inherited this gene, and thus feel as if they can exert some control over their lives. For instance, they might choose to undergo a double mastectomy and ovariectomy, thereby diminishing the possibility of developing breast or ovarian cancer. Others, in contrast, prefer not to know and are seemingly able to compartmentalize these thoughts and go on with life. However, where is the cut-off between feeling 'safe' and feeling sufficiently 'at risk' to take actions to thwart uncertain events? How certain (or uncertain) must a woman be that she will develop a form of cancer before she decides to take preventative action. This certainly varies across individuals, depending, for instance, on their tolerance for uncertainty and situational factors (e.g., does the woman have children who would be affected by her decision?).

Ambiguity

Related to uncertainty and unpredictability is the ambiguity of a threat. Ambiguous situations are those in which the available information is murky so that one might become suspicious that some bad event could occur, but be reluctant to become overly reactive. Thus strong responses are held in abeyance pending better information becoming available. It isn't unusual for individuals to develop physical symptoms that aren't sufficiently coherent to prompt them to seek medical attention, but are nevertheless worrisome. People will sometimes do nothing in the hope that the vague symptoms will simply disappear, but depending on their intolerance of uncertainty they might decide to see a physician. Of course, when symptoms are vague it's difficult for a physician to form a diagnosis and he/she will likely send the person off for tests that might cast some light on the situation.

When we encounter situations that involve a degree of risk, but in which ambiguity or unknowability are prominent, neuronal activity increases markedly in brain regions involved in decision making (Bach et al., 2009). Our brain seems dissatisfied with ambiguity, and neuronal activity may increase in an effort to make sense of this situation, especially among individuals with high intolerance for uncertainty. From the Kahneman and Tversky perspective, under these ambiguous conditions it is likely that a *representative heuristic* would be adopted in making an appraisal (i.e., appraising the situation based on other previous similar situations), and then acting accordingly.

Complexity

Some situations may become terribly complex, and it is difficult to decipher all the options before us, let alone make choices regarding the most appropriate way forward. When this occurs, and we're not blessed with a brain sufficiently adept to work out all the possible combinations, what we tend to do, as Kahneman indicated, is consider the problem in a simpler way or search for a simple solution to the problem (such as go with the opinion of our ingroup).

CHOOSING NOT TO CHOOSE

In his book *Paradox of Choice*, Schwartz (2004) points out that we like the idea of having choices, but having too many choices can be distressing. For instance, given too many options, individuals might think less about what they could gain from making a particular choice, and instead might focus more on missed opportunities that come from making other choices. Likewise, the tyranny of having too many choices may cause feelings of dissatisfaction with choices made. In a sense, when many choices are available that are equally palatable, as when choices are complex, people get stuck in their tracks and might make no choice at all. My friend tells me that a standard routine in her business is to provide customers with several options, so that they can get what's suitable for their kid. As it turns out, some individuals are readily overwhelmed by the choices, and their response is

often “I think I’ll go home and think about it”. She fumes at this: “She’s going home to think about it! What’s there to think about? She’s not making a critical decision like should I choose mastectomy versus lumpectomy”. She says that she used to offer fewer choices, carrying only the single product that she believed was best. Although customers almost invariably followed store recommendations, they weren’t fully satisfied unless they had choices.

Volatility

A characteristic of some threats is their volatility, in that features of the situation can change quickly and unpredictably. This type of threat is encountered in combat situations and among first responders, but hasn’t been as widely studied in relation to stressors in other milieus. Some stressors encountered might get progressively worse or diminish systematically, and in either case we have the opportunity to adapt to the demands placed on us. However, there are instances in which stressors don’t follow a predictable trajectory and go from a minor fire to a full-blown conflagration in just an instant. A headache shows up as an ‘anomaly’ on a brain scan, which can turn out to be an aggressive tumor based on a follow-up biopsy. One moment the person was perfectly healthy, and then they weren’t, all in the blink of an eye. Clearly, this is very hard to deal with, and we need to be prepared, be nimble in using particular coping strategies, and have social networks that are ready and able to come to our side when the need arises.

ILLUSIONS AND DELUSIONS REGARDING STRESSORS

Many of us are deluded in thinking that we are in some way able to control our destinies, and that life has a predictable flow, and so we make plans for the future and behave as if we can reliably predict what’s in store for us. Of course, with even a little bit of thought we realize that the predictability and controllability of life events are illusions (or delusions) that we adopt. It’s obviously not for nothing that expressions have arisen that become folk-wisdom. Woody Allen’s comment “If you want to make God laugh, tell him about your plans” adequately interprets the expression “mann tracht unt got lacht” – People think (plan) and God laughs.

Faulty assumptions concerning the degree of control we have over our lives might, unfortunately, leave us less prepared to deal with unpredictable, ambiguous, and volatile stressful situations when they do arise. Sudden unexpected illness, or events that affect whole communities (terrorists attacks, wars, nuclear plant meltdowns, hurricanes, famines, and floods) might catch us by surprise, and our ability to deal with these events might not be as direct and useful

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as they would be if there had been an opportunity to prepare. In considering stock market investments, Taleb (2010) suggested that any given event that can shake the market is rare, which he refers to as a black swan, but given the number of potential events that can happen, it's unlikely that market shake-ups can entirely be avoided. Likewise, although any single traumatic event that we could personally encounter might occur infrequently, the sheer number of potentially negative events that are possible makes it unlikely that we'll get away entirely unscathed. In fact, 50–60% of individuals, even those of college age, reported that they had encountered traumatic events sufficiently severe to fill them with fear and horror. This brings us to the obvious question of what we ought to do about this. Is it possible to take pre-emptive steps so that we're relatively flexible in dealing with diverse events as they occur, or do we simply accept situations for what they are?

PREVIOUS STRESSOR EXPERIENCES

Stress sensitization

The stressors that we encounter are often moderate and transient, and not long after they've passed they might be banished from consciousness. As brief as a stressor might be, however, some events can haunt us for extended periods. This can occur as a result of encountering reminders of the event, whereas in other instances, such as experiencing public shame or humiliation, where we are diminished in the eyes of others, diminished feelings of the self might be incorporated into an individual's self-schema. As described by Nolen-Hoeksema (1998), although a stressor experience might have been transient, the rumination that follows may be far more persistent and can be exceptionally damaging.

How we appraise events may be influenced by our previous stressor experiences. Individuals who have experienced a traumatic event may subsequently be more cautious in relation to potentially stressful stimuli, and reminders of these experiences may have profound psychological and physical repercussions. These persistent effects of stressors likely come about owing, in part, to the brain's neuroplasticity. It will be recalled that in response to experiences, synaptic connections between neurons can be established and further strengthened as these experiences occur again. More than this, as we'll see in more detail in Chapter 5, stressful experiences may result in changes in the sensitivity or reactivity of neuronal processes, referred to as *sensitization*, so that later stressors will re-induce neuronal activation, thereby altering behavioral responses (Anisman et al., 2003). In fact, although fairly strong stressors may be needed to provoke a first episode of depression, the recurrence of illness can be brought about by relatively small challenges (Kendler et al., 2000) or even by reminders of stressful experiences (Monroe & Harkness, 2005).

Chronic stressors and allostatic overload

Some stressors may be encountered repeatedly and their nature might not vary appreciably over time, and thus we might be able to find ways to adapt to or deal with them. However, we might also encounter chronic challenges that are unpredictable and vary over time. As well, some chronic stressors, such as illnesses or caregiving for a person with psychological or physical disturbances, can have multiple secondary effects that are uncontrollable, unpredictable, and uncertain, making them that much more aversive and much more likely to affect us in the most negative ways. Whether we meet multiple stressors, or a stressor that causes continued rumination (or the individual is the ruminative type or disposed to chronic worrying), when brain regions associated with stress never have the opportunity to be recuperate, pathological outcomes may ensue (e.g., Yan et al., 2013).

TIME-OUT FROM STRESSORS

Through active or passive processes, the effects of stressors on biological systems ought to dissipate and hence negative outcomes are forestalled or entirely prevented. When reminders of the event are intermittently encountered, however, the dissipation of pathological processes is precluded (Maier, 2001). For individuals experiencing pervasive, continuous, ongoing stressors, such as those associated with war or stigmatization, their impact is doubly disastrous because they may lack safe places that would allow for healing and recovery to occur.

As we'll see, many neurotransmitter, endocrine, immune, and peripheral nervous system changes occur in response to stressors. These biological changes, which are usually activated fairly quickly, are essential to maintain stability within biological systems, while simultaneously providing resources needed to deal with external threats. These neurobiological adaptations, referred to as allostasis, operate together with behavioral, cognitive, and social processes to maintain our well-being. Allostasis is much like homeostasis, but because of the urgency of many stressful situations, it involves rapid mobilization of biological resources. As much as this is highly adaptive, when these mechanisms are engaged for protracted periods, *allostatic overload* may be experienced, wherein neurobiological circuits become overly taxed or might themselves have negative secondary repercussions on brain and body systems. As a result, vulnerability to a range of illnesses may be increased, including heart disease, immune-related disorders, neurodegenerative illnesses as well as psychological disturbances (McEwen, 2000). In addition to challenges that impact on us directly, insidious challenges comprising sustained social disturbances, social conflict, and poverty can engender what McEwen and Wingfield (2003) referred to as 'type 2' allostatic overload, which can markedly influence well-being and may require changes of social structures to prevent the development of pathology.

Cumulative stressor experiences

Most of us will experience stressors on multiple occasions, which may have cumulative effects that affect our health. The accumulation of stressors, such as living in a poor social environment, social isolation, and emotional disturbances may favor the processes that contribute to the development and progression of physical illnesses (Steptoe & Kivimäki, 2013). When multiple stressful events begin during childhood, including events secondary to childhood maltreatment and disturbed home environments, the odds of developing depression, suicidality, and drug abuse, as well as comorbid physical illnesses such as diabetes, are appreciably elevated in adulthood (Dube et al., 2003). Many of these illnesses such as heart disease, diabetes, and immune-related disorders don't simply appear overnight, but reflect the accumulation of small changes that develop over an extended period.

SURE ENOUGH, STRESS MAKES YOU OLD BEFORE YOUR YEARS

Some effects of chronic strain might be detectable by evaluating patterns of neurobiological changes (e.g., altered daily neurobiological rhythms), but in the main, the effects of chronic stressors aren't easily detected based on simple biological markers. Not long ago, evidence emerged that stressor experiences might have effects on telomeres, the caps that protect the tips of chromosomes, much like plastic aglets that protect a shoe lace from unravelling. With each replication of a cell these telomeres become shorter, so that with age the shortening of the telomeres will result in the cells being unable to replicate or dying (Sanders & Newman, 2013).

It is especially pertinent that stressful experiences are also accompanied by a reduction of the length of telomeres, and in a sense can be a marker of both aging and cumulative stressor experiences. Telomere length has been associated with stressful encounters during childhood, including maternal violence, verbal or physical assaults, or even witnessing domestic disputes (Entringer et al., 2011). Likewise, adult stressor experiences and reduced social support, lower optimism, and elevated physiological stress reactivity were accompanied by shortening of telomere length (Zalli et al., 2014), as were poor life-styles, smoking cigarettes, and high alcohol consumption (Bendix et al., 2014). Shorter telomere length has been related to a variety of age-related diseases, such as diabetes and heart disease, and appears to be dose-dependently related to early-life stressors in the sense that greater stress is accompanied by more pronounced illness (Price et al., 2013). Shortened telomere length is also linked to childhood adversities and lower socioeconomic status, which was linked to poorer health (Cohen et al., 2013). Given that stressors and poor life-styles are accompanied by reduced telomere length, is it also the case that positive life-styles are accompanied by increased telomere length? There have been reports indicating that moderate exercise increased telomere length, but this was attenuated with too much exercise (Ludlow et al., 2013), which, as we'll see later, may also be accompanied by poorer health outcomes.

It is uncertain whether telomere changes that have been observed were responsible for age- or stress-related health disturbances, although this claim has been made (see Chapter 11 dealing with cancer), but they might serve as a marker for their occurrence. Much like rings on a tree can inform us about its age and experiences (e.g., past weather conditions), telomere length can provide indications of past stressors, although the length of the telomeres doesn't tell us when the stressors occurred or what they comprised.

Coping processes

Having identified and appraised a stressor and deemed it to be a threat, particular coping strategies will be called upon in an effort to eliminate it or to diminish its impact. The coping strategies we use may vary across situations, but might be guided by our disposition to cope in particular ways (i.e., style of responding). Many coping methods can be used to deal with stressors, but they generally fall into about 15 coping methods that can be conceptualized within three broad classes: problem-, emotion-, and avoidant-focused coping. Often-used coping strategies within each of these three categories are described in Table 4.1, which I adopted from an earlier book that dealt with stress and coping (Anisman, 2014). In examining this table, you'll see that most coping methods were assigned to one category or another. However, many coping methods don't fall comfortably into a particular category, but instead serve in multiple capacities, depending on the context, and their role may also vary over the course of a lengthy stressor experience.

Table 4.1 Coping strategies

Problem-focused strategies

Problem solving: Finding methods that might deter the impact or presence of a stressor.

Cognitive restructuring (positive reframing): Reassessing or placing a new spin on a situation so that it may take on positive attributes. This can entail finding a silver lining to a black cloud.

Finding meaning (benefit finding): A form of cognitive restructuring that entails individuals finding some benefit or making sense of a traumatic experience. This might involve private, emotional, or cognitive changes, or active efforts so that others will gain from the experience.

Avoidant or disengagement strategies

Active distraction: Using active behaviors (working out, going to movies) as a distraction from ongoing problems.

Cognitive distraction: Thinking about issues unrelated to the stressor, such as immersing ourselves in our work, or engaging in hobbies.

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Table 4.1 (Continued)

Denial/emotional containment: Not thinking about an issue or simply convincing oneself that it's not particularly serious.

Humor: Using humor to diminish the distress of a given situation.

Drug use: Using certain drugs in an effort to diminish the impact of stressors.

Emotion-focused strategies

Emotional expression: Using emotions, such as crying, anger, and even aggressive behaviors, to deal with stressors.

Other-blame: Comprises blaming others for adverse events. This is used to avoid being blamed, or as a way to make sense of some situations.

Self-blame: Blaming ourselves for events that occurred.

Rumination: Continued, sometimes unremitting thoughts about an issue or event, or replaying the events and the strategies that could have been used to deal with events.

Wishful thinking: Thinking what it would be like if the stressor were gone, or what it was like in happier times before the stressor had surfaced.

Passive resignation: Acceptance of a situation as it is, possibly reflecting feelings of helplessness, or simply accepting the situation without regret or malice ('it is what it is').

Religion

Religiosity (internal): A belief in God to deal with adverse events. This may entail the simple belief in a better hereafter, a belief that a merciful God will help diminish a negative situation.

Religiosity (external): A social component of religion in which similar minded people come together (congregate) and serve as supports or buffers for one another to facilitate coping.

Social support

Social support seeking: Finding people or groups who may be beneficial in coping with stressors. This common coping method is especially useful as it may buffer the impact of stressors and also serve multiple other functions in relation to stressors.

Stressor-provoked mood changes, such as depression, are often accompanied by high levels of emotion-focused coping and low levels of problem-focused efforts. As a result, it is often thought that emotion-focused coping methods are maladaptive, whereas problem-focused methods are preferable. In many instances this is the case, but this is far too simplistic. An emotional coping strategy that comprises verbal and nonverbal messages concerning one's emotions might reflect a request for help. As well, emotional coping can be used in acknowledging, exploring, and understanding emotional responses to challenges, and in emotionally charged situations it might be beneficial in helping individuals come to terms with their feelings, thereby diminishing distress (Stanton et al., 1994).

In some situations, especially when events are seemingly out of the individual's control, such as dealing with a terminal illness, problem-solving efforts might be of little benefit. Attempting to cope through problem-solving efforts may offer individuals the illusion that they have some control over their life, but it might be more effective to use avoidant coping methods (distraction) so

that they can function effectively on a day-to-day basis. When a stressor is sufficiently severe, our capacity to cope through problem solving may also be disturbed as people might have difficulty planning and initiating actions. Furthermore, unlike non-stressed individuals, who, when placed in a problem-solving situation, ordinarily take the simplest approach to reach a solution, highly stressed individuals frequently engage in excessively complex strategies, despite not being able to articulate why they chose these strategies. In effect, stressful events may influence the way we deal with situations, moving us away from purposeful, conscious approaches to those that might not be particularly productive.

Although we've seen that there isn't a best single strategy to deal with all situations, there are certainly some people who are better able to deal with stressors than others. Several factors might feed into this ability, including being able to make appropriate appraisals of the situation. It is also essential to appreciate that any given coping strategy typically isn't used in isolation of others, and multiple coping methods are often used concurrently. Individuals who are best at dealing with stressors are those who are relatively adept in using particular coping strategies in conjunction with one another (Matheson & Anisman, 2003). By example, although rumination has frequently been associated with depressive illness (Nolen-Hoeksema, 1998), this occurs primarily when individuals adopt negative rumination in which other emotion-focused strategies (self-blame, recrimination, emotional expression) are co-expressed. Among individuals who are not depressed, stressors may lead to rumination, but this strategy may be accompanied by problem- and emotion-focused strategies, as well as cognitive disengagement (e.g., Things are bad right now, and I need to carefully consider the options I have available, or perhaps consult with some friends to find a way out of this jam) (Kelly et al., 2007). There is reason to believe that individuals who are skilled at using a relatively broad range of coping strategies, and who are flexible in their choice of coping methods, being able to shift from one strategy to another as the situation requires, may be best suited to deal with stressors. Furthermore, the use of particular coping strategies may vary over time following a stressor's first appearance (Tennen et al., 2000), and being able to adapt appropriate coping combinations as the stressor situation plays out may be advantageous. Those individuals with a narrow range of coping methods, especially if they are rigid in abandoning ineffective coping strategies, will likely be at a disadvantage and most likely to fare poorly (Cheng et al., 2014).

Finding meaning and personal growth

In response to mild or moderate stressors, we might put a particular spin on the situation as a way of coping. Cognitive restructuring, as described earlier, might comprise finding something positive in a negative situation, but this likely won't do the trick in response to very strong stressors. In such instances, cognitive restructuring may take on a different form, termed post-traumatic growth (also referred to as finding meaning or benefit finding). Having lived through a traumatic experience, individuals might try to make sense of the event and actually find some benefit from the experience (Davis et al., 1998). Survivors might use the experiences as a learning opportunity to improve their physical and mental health, or they may engage in a particular cause in an effort to spare others from similar experiences. In many cases we've seen successful national campaigns come out of such tragedies, such as creating laws against drunk driving or establishing programs to treat diabetes, spinal cord damage, Parkinson's disease, and mental illness, although in other cases positive outcomes have been limited (e.g., banning assault weapons).

At an individual level, those living through a severe trauma, such as dealing with cancer, might recognize positive implications of their experience or feel that they have grown from the experience (Sherman et al., 2010).

The struggle to survive an illness or the challenge of taking on large corporations that are viewed as being responsible for deaths due to negligence lend themselves to finding meaning. Yet, as much as a person might want to find meaning in horrible events, this might not always pan out. Searching for meaning ('meaning-making efforts') and arriving at a meaning ('meaning made') may be independent of one another, and not every person in search of meaning finds it (Park, 2010). For that matter, continued, unsuccessful efforts to find meaning might be indicative of an unhealthy preoccupation with an adverse event. In essence, finding meaning might only be effective to diminish distress for a subset of people and might not be useful across all situations. Meaning obtained through caregiving or by promoting research to treat specific illnesses can be psychologically healing. It's something else entirely to find meaning in relation to a person who died when drunkenly driving off the road, or death that occurred as a result of some freak act of nature, such as being hit by lightning.

COPING THROUGH RELIGION

There are topics that, as soon as they're raised, cause great controversy or condemnation, and for some individuals the value of religion sometimes falls into this category. There are many people who believe that religion is inherently bad or foolish, but for others it's an effective strategy to deal with stressful experiences. It's a core component of their identity, and it can serve as an effective coping strategy, providing comfort, especially when all else has failed (Pargament, 2001). Provided that it isn't an exclusive alternative for dealing with illness (e.g., simply praying that a cancer will disappear isn't a great curative method), religion can help to diminish health disturbances that might be elicited by stressors (Weber & Pargament, 2014). Religion also fosters a system of beliefs that allows individuals to find meaning in an experience (Park, 2010), and may limit feelings of hopelessness as events might be 'under God's control'. Beyond these attributes, religion might provide a social support network from like-minded people to promote solace and peace of mind and may also facilitate problem-focused coping (Ysseldyk et al., 2010). Spirituality has indeed been linked to lower depression and correspondingly greater neuronal density within brain regions, such as the prefrontal cortex and hippocampus (L. Miller et al., 2014), although there have also been reports that religion in late life was accompanied by hippocampal atrophy (Owen et al., 2011).

SOCIAL SUPPORT

Social support is among the most effective ways of dealing with stressful situations. Having support might be instrumental in eliminating stressors, but failing this, it could serve to buffer against some of the adverse psychological effects that might otherwise occur, and might promote

physical health and recovery from illness (Carod-Artal & Egido, 2009). Social support can also diminish stressor-elicited hormonal and immunological changes that might have adverse consequences (Heinrichs et al., 2003), and attenuate stressor-provoked neuronal activity changes within the right prefrontal cortex and amygdala (Taylor et al., 2008).

Multiple coping functions can be provided through social support, which may vary with particular personality characteristics and change over the course of a stressor experience (DeLongis & Holtzman, 2005). For instance, when first diagnosed with a severe illness, an individual might rely on social support for problem solving (e.g., get advice, finding alternative treatment strategies) and for support. As the disease progresses, the social support may be combined with emotional coping that entails having someone to talk to about feelings, and, still later, the instrumental aspects of the support (e.g., trips to hospital) may become more apparent. Over the course of the illness, especially when things reach the bleakest point, social support may be used for comfort and finding peace.

SUPPORT AND POSITIVE PSYCHOLOGY

If negative events cause health problems, can we expect that positive events will encourage good health? There is reason to believe that pleasant emotions may be accompanied by better immune functioning than that apparent among those experiencing negative events (Barak, 2006) and that having an optimistic personality allows for better regulation of stress hormones (Jobin et al., 2014). In line with such findings, a 15-year prospective study indicated that positivity was accompanied by a lower risk for chronic heart disease, even taking into consideration other risk factors. Moreover, positive mood among individuals with an already established illness was predictive of lower levels of mortality (Chida & Steptoe, 2008).

Interventions based on positive psychology enhanced well-being and diminished depressive mood (Bolier et al., 2013). As well, maintaining a positive mood can facilitate the adoption of proper health behaviors, and may diminish some adverse neurobiological effects of stressors (just as having social support can act in this capacity), and when individuals do become sick they might be more likely to adhere to recommended treatments. However, in relation to chronic, progressive diseases, where damage is already extensive, as in the case of heart disease, it is less certain whether adopting a positive mood can turn back the clock and instigate a cure.

Limits of social support and unsupportive relationships

As useful as social support typically is, especially when it comes from a welcome source, such as a group or person with whom we strongly identify, it might not always be the ideal way of coping. A person might want independence and hence might not wish for external support or, alternatively, seeking support might reflect a sign of weakness in some cultures and hence might be eschewed. Furthermore, individuals might not wish for support as it might make them feel indebted, which might create a burden for them (indeed, there are people who, after doing a good deed, can't help themselves, following this up with "hey, remember, you owe me big time", which entirely undoes their good behavior).

There are researchers and clinicians who believe that positive psychology and social support are all well and good, and can be a useful auxiliary treatment for dealing with illnesses, but don't provide a cure. For that matter, there is some question about the meaningfulness of data that have been obtained in some studies. For instance, there have been reports that social support is accompanied by enhanced immune functioning, but we need to question whether this actually translates into improved health. A 10% or 20% rise of immune functioning, although statistically significant, might not reflect appreciably greater ability to fight infection or cancer. In essence, in considering the influence of positive psychology, or any other treatment to ameliorate illnesses, it is essential to distinguish between effects that are statistically significant from those that are practically meaningful.

Unsupportive relations

Occasionally, a person who seeks support might have their request rebuffed, or encounter a response that is not helpful. Such responses might comprise laying blame (e.g., "well you should have thought of that" or "there's two sides to every story"), bumbling (essentially not knowing what to say), minimizing or forced optimism ("don't worry, everything will work out alright"), as well as disconnecting or distancing themselves (they seem not to want to hear about it or pretend not to have seen you). These *unsupportive interactions* seem to be more damaging than simply not having support, and are prominent in making negative situations worse (Ingram et al., 2001). The negative effects of such interaction on health outcomes have been seen in relation to discriminatory events (McQuaid et al., 2014), among women in abusive dating relationships (Matheson et al., 2007) as well as those affected by HIV/AIDS (Song & Ingram, 2002). The negative consequences of unsupportive events can be exceptionally damaging in relation to severe illness, as we'll see in Chapter 14. It's especially unfortunate that occasions of unsupportive actions not only occur at a personal level, but also appear in relation to group behaviors. As Martin Luther King indicated, "In the end we will remember not the words of our enemies, but the silence of our friends", or as Elie Wiesel put it, ". . . to remain silent and indifferent is the greatest sin of all". These statements aren't nearly as harsh as those found in Dante's ninth circle of hell, which is reserved for those engaged in betrayal or treachery.

Social rejection and ostracism

Of the many stressors that can be encountered, social rejection (ostracism) is one of the most powerful. Ostracism comes in many forms, with discrimination being the most pernicious, but it also comes in other demeaning ways. Members of a group often feel as if they comprise a unified social entity (*entitativity*), and having individuals who negatively represent them (e.g., they're not cool) might promote a '*black sheep effect*', in which outliers are denigrated in an effort to preserve the good standing of the group as a whole (Eidelman & Biernat, 2003). Targeted rejection can undermine self-esteem and promote or exacerbate depressive mood. Adolescents can be fairly mean to one another (e.g., bullying), and it isn't uncommon for them to form new relationships, and in doing so dump earlier friends, who might feel ignored, rejected, diminished, or ostracized. The negative feelings of rejection are also apparent in relation to online social exclusion, especially as it can be made apparent for all to see that a person has been defriended on a social media site.

Within a laboratory context, social rejection has been assessed through ‘cyberball’, a computer game in which a virtual ball is tossed between three icons, one of which is controlled by a participant, whereas the other two are controlled through a computer, and not by actual people as the study participant believes (Blackhart et al., 2007). At first, the ball is passed between the players equally, but soon the two computer-driven icons pass the ball to one another, leaving out the participant. Even though this is a game, with little at stake for the participant, it elicits negative ruminative thoughts, altered mood, hostility, and elevated cortisol levels (McQuaid et al., 2015). As well, functional magnetic resonance imaging (fMRI) imaging indicated that ostracism in this situation promoted increased neuronal activity within the dorsal anterior cingulate cortex (Eisenberger et al., 2003), not unlike the effects of a physical stressor (Eisenberger, 2012). Thus, it was suggested that emotional and physical pain may involve overlapping neural circuits. In a sense, positive social interactions may be a fundamental need (like food or water) and our brain responds to social pain so that we can make the proper adaptive responses to thwart social challenges.

STRESSOR EFFECTS ACROSS THE LIFE SPAN

Altering life trajectories

The malleability or the plasticity of the brain is evident throughout life, but it is especially profound during early-life periods, so that stressors encountered at this time may have particularly poignant effects. Freud was an early advocate of the notion that stressful experiences at one time in life could have effects at later times. His theorizing obviously preceded our understanding of neuroplasticity, and the concept of sensitization hadn’t yet been developed, but he nevertheless understood that stressful experiences could instill profound and lasting effects, serving as ‘an agent still at work’.

CHAOTIC LIFE TRAJECTORIES

Many individuals believe that they had experienced ‘turning points’ that influenced the trajectory that their lives took. These turning points can be unique to particular individuals or they can be universal in the sense that large numbers of people had the same experience and were affected in a similar same way (Wheaton & Gotlib, 1997). These turning points can be influenced by age, gender, and the context in which these occurred, as well as by previous stressor experiences.

In a book meant for the lay person, which includes a discussion related to life trajectories, turning points, and happenstance, I use a game of billiards (pool) as a metaphor for ‘chaos theory’ that might be relevant to life changes stemming from seemingly small events (Anisman, 2015). In a game of pool 15 balls of various colors are aligned to form a triangle at one end of a pool table. A player at the other end of the table strikes a white cue ball, which smashes into colored balls

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sending them careening in various directions. If a second shot (a do-over) were permitted, it would similarly travel across the table, but its trajectory might be off by a slight amount, say 1° . The trajectory of this ball would diverge from the first with the distance travelled, hitting the 15-ball pack of colored balls at a slightly different point. In both instances the balls would go off in different directions, but where they came to rest would differ in the two instances. Even a very small deviation at the point of origin, a mere 1° , would engender markedly different outcomes. As the pool balls careened about the table, a ball might have ended up in a pocket or, alternatively, it might have been headed for a pocket, but another ball struck it, altering its route. It's equally possible that by chance the cue ball might have had its course diverted so that it ended up in a pocket, which in pool is not a good outcome at all.

This is reminiscent of chaos theory; minuscule differences at the outset can produce greater and greater differences as we move outward in time or distance from the initial event. Secondary effects associated with these divergent paths create still greater differences, and predictions of the future thus become exceedingly more difficult. However, irrespective of where the white ball hit the pack, if one were to place the cue (stick) diagonally on the table with the narrow end pointing at an end pocket, those balls that ran into the cue with enough momentum would roll down it and into the pocket (Do you get the feeling that I know too much about pool and spent some unproductive time at it when I was younger?).

Turning to human behavior, we can make some probabilistic statements that likely won't be met with considerable opposition. For instance, negative early-life events will likely, but not necessarily, lead to adverse outcomes, whereas positive events will lead to better outcomes. This said, regardless of the individual's early experiences or the genes that had been inherited, the consequences aren't fixed in stone, and later events can, for better or for worse, serve as turning points that alter life trajectories, much like placing a cue diagonally across the pool table can do so. Negative early environments, sickness, poverty, and so many other factors can push individuals in bad directions, but the effects of negative circumstances can sometimes be undone or prevented.

Prenatal experiences

It's long been known that women who consume particular drugs during pregnancy place the fetus at risk for malformations (*teratogenic effects*). Although public perceptions of the teratogenic consequences of various agents had at one time focused on blatant physical abnormalities, they can also comprise altered mental development as well as neuropsychiatric conditions that might not be accompanied by obvious structural malformations. The magnitude of a teratogenic effect is influenced by the dosage of the teratogen, and are typically more pronounced the earlier in pregnancy the teratogens are encountered, although they can have effects at other times as well. Vulnerability to the negative actions of a teratogenic agent may also depend on the genotype of the fetus and the ability of the agent to come into direct contact with the fetus.

We usually think of teratogens as agents that were inhaled or ingested or perhaps applied to the skin (e.g., certain medications or alcohol), although they should be viewed more broadly. Environmental toxicants that are encountered on a daily basis, such as second-hand smoke or pollutants encountered

in larger cities or industrialized regions, as well as PCBs (polychlorinated biphenyls) and even common household chemicals, can potentially affect the developing fetus. Likewise, what mom eats or fails to eat may profoundly affect the offspring. Viral challenges can also have profound effects on the fetus, and stressful events encountered during pregnancy can affect the physical and psychological well-being of the offspring, often persisting into adulthood (Beydoun & Saftlas, 2008).

Prenatal resources

Ideally, the fetus ought to go through its development without hazards being encountered, but this isn't always the case, especially if mom isn't knowledgeable about prenatal care (e.g., in the use of drugs or teratogenic agents), but unlucky events can also occur that threaten the well-being of the fetus. Typically, pregnant women in high income countries see physicians about 50% more often than non-pregnant women do, and there's a relatively large cohort who tend not to seek medical help or advice. Numerous factors contribute to this, many of which are linked to poverty (living in distressed neighborhoods or those with higher rates of unemployment, low family income, uninsured status), low education level, and an array of maternal factors (young maternal age, non-marital status, planned pattern of prenatal care, late recognition of pregnancy) (Feijen-de Jong et al., 2012). Too often children of mothers with these characteristics are more likely to experience fetal distress and will start off life with some physiological disadvantages.

Prenatal stressors

Prenatal stressors aren't limited to those that comprise trauma, such as war-time experiences, but also include workplace stressors, psychological abuse, discrimination and bereavement, and, in rodents, even witnessing another rat being stressed was sufficient to induce profound morphological disturbances in brain regions of subsequently born pups (Mychasiuk et al., 2011). Predictably, the negative repercussions on the developing fetus are especially notable if a woman encountered multiple psychological stressful experiences (Robinson et al., 2011). Clearly, it would be of considerable benefit to find methods of diminishing the distress experienced by pregnant women. In some instances this isn't possible, but having a nurturing and positive postnatal environment can undo some of the adverse effects of prenatal stressors, making it that much more important to provide adequate support programs for distressed mothers and their infants (Luby et al., 2013).

In humans, strong stressors experienced during pregnancy increase the risk of premature delivery and low offspring birth weight, just as such an outcome is more frequent among women experiencing high levels of anxiety or depression (Staneva et al., 2015) or those who smoke, drink alcohol, or use cocaine (Parazzini et al., 2003). As well, altered levels of several hormones have been associated with prenatal stressors and premature delivery, which may be accompanied by delayed fetal neuromuscular and nervous system maturation, diminished grey matter volume, and impaired mental development (Sandman et al., 2011). These children may develop cognitive disturbances (e.g., delayed language development, attention deficit hyperactivity disorder), as well as emotional problems (e.g. fearfulness and anxiety) that are first manifested during childhood, often carrying through into adulthood (Glover, 2011). Moreover, epidemiological studies indicated that these experiences were linked to physical illnesses, such as disturbed cardiovascular regulation (Mastorci et al., 2009), type 1 diabetes (Virk et al., 2010), and metabolic syndrome that might foreshadow adult type 2 diabetes (Rinaudo & Wang, 2011). Elevated production of

both pro- and anti-inflammatory cytokines related to these events could potentially influence later psychological disorders (Entringer et al., 2008), as well as vulnerability to allergies, asthma, and infectious diseases (Nielsen et al., 2011). In fact, among humans who had experienced prenatal distress, their adult profile of cortisol and ACTH was in line with that associated with PTSD, leading to the suggestion that they were particularly vulnerable to this disorder, as well as other psychological disturbances in the face of adult stressor experiences (Entringer et al., 2009). Consistent with this view, treatments that simulate some of the actions of stressors, such as administration of the synthetic glucocorticoid betamethasone (used in an effort to promote maturation in fetuses at risk of preterm delivery), influenced infant temperament and behavioral reactivity (Davis et al., 2011).

Prenatal viral challenges

Just as activation of the inflammatory immune response can trigger hormonal and brain neurotransmitter alterations that can have long-term repercussions, prenatal viral challenges also affect later pathology in the offspring. Fetal exposure to syphilis, rubella, herpes simplex, toxoplasmosis, and other viruses may elicit various morphological disturbances, and could potentially be involved in provoking learning disabilities. There has also been growing evidence of a link between prenatal viral experiences and the emergence of psychiatric disturbances, such as schizophrenia (Brown, 2011; Meyer & Feldon, 2009).

Identifying causal connections between prenatal viral infection and the subsequent emergence of pathology is understandably challenging and this is especially true of the link to schizophrenia, which might not emerge until late adolescence. This is further hampered by the fact that viral and bacterial challenges can have multiple biological consequences, making it difficult to identify links between specific immunological challenges and particular neurobiological changes that lead to a psychopathological condition. Nonetheless, prenatal infection in rodents promoted brain morphological changes linked to schizophrenia, such as diminished size of cortical and hippocampal regions, as well as altered dopamine activity and receptor functioning (Meyer & Feldon, 2009). The dopamine changes were apparent irrespective of whether pups were raised by the mother that had experienced infection during pregnancy or a surrogate mother (following birth), suggesting that the prenatal experience, rather than those associated with postnatal maternal care, was fundamental in the provocation of later behavioral disturbances. It is especially interesting that the schizophrenia-like effects of prenatal infection were not apparent soon after birth, but, as in humans, emerged during the adolescent period (Meyer et al., 2008) and could be attenuated by antipsychotic medications that act on dopamine functioning.

Consistent with the data obtained from animal studies, the occurrence of viral epidemics in humans (rubella, influenza, toxoplasma gondii, and herpes simplex virus type 2) was related to a considerable increase (500–700%) in the birth of children who later developed schizophrenia (Brown, 2011). Although viral insults and the resulting inflammatory changes could potentially affect neuronal processes that provoke schizophrenia, other factors might also be related to this outcome, including febrile (fever) responses, malnutrition, and fetal hypoxia secondary to infection (Brown, 2011). In a review of this literature, Harvey and Boksa (2012) pointed out that prenatal infection has been associated with numerous pathological conditions, including not only schizophrenia, but also autism, cerebral palsy, epilepsy, and Parkinson's disease. Thus, they suggested that prenatal and early postnatal infection might act as a general vulnerability factor for neurodevelopmental disorders, but other factors govern which specific illness will emerge.

AUTISM AND IMMUNITY

Autism may be instigated by genetic factors, and possibly by prenatal or early-life factors. It is possible that autism is linked to immunologically-related processes, but this line of inquiry has an exceptionally tainted background, largely owing to controversial reports by Andrew Wakefield, a British physician and medical researcher, who claimed that MMR (mumps, measles, rubella) vaccination led to autism. It turned out that Wakefield's claims were fraudulent and his published work, such as that in the prestigious journal *Lancet*, has been withdrawn. When his report was first published, it had huge repercussions as parents stopped immunizing their children, thus leaving them vulnerable to diseases.

There probably isn't a single factor that leads to all instances of autism. Fetal experiences or those that occur early in life (e.g., very premature birth and the concordant hypoxia that goes with it) might contribute to this disorder, as might epigenetic changes (Zhubi et al., 2014). Among those with autism, microglia, astroglia, and cytokine levels are elevated, possibly reflecting chronic inflammation owing to the genes for inflammation being continuously switched on (Angelidou et al., 2012). It might not be that a virus itself is causing autism as much as the strong immune response in the pregnant mother causes this outcome or that mothers of children with autism have particular antibodies that can bind to fetal brain proteins, thereby causing damage. To be sure, these are simple correlations that don't address causal links, but they do raise the possibility of autism being associated with immune cells turning against the fetal brain.

Early-life challenges

Childhood experiences, ranging from those that are positive and nurturing through to trauma and toxic environments, shape developmental trajectories, so that behavioral and neurobiological processes are markedly affected, and vulnerability to illnesses in adulthood may be altered. Indeed, children who experience a trauma are more likely to develop pathological illnesses, such as depression and PTSD (Kendler et al., 2004). Such early experiences can be 'programmed' into various neurochemical, hormonal, and immunological processes so that individuals become more likely to be affected by later stressor experiences. This might reflect changes in the reactivity of biological systems, and could also affect how individuals appraise or cope with challenges (Compas et al., 2001). They might become less trusting, have difficulties forming social relations, experience disturbed self-regulation, and adopt poor life-style choices, any of which could aggravate disturbed neurobiological processes (Miller et al., 2011).

When the term early-life stressor is used, people might incorrectly think of traumatic experiences that involve sexual or physical abuse, and pay inadequate attention to psychological abuse, which can also have devastating short- and long-term consequences. The latter form of abuse includes neglect, withholding affection, parental problems (e.g., mental illness, addiction), family disturbances, and poverty (Harkness et al., 2006), which occurs in almost half of children and adolescents (Bethell et al., 2014). The consequences of very negative early experiences vary broadly, taking the form of disrupted school performance, impaired decision making and diminished ability

to form and maintain close relationships, increased stress reactivity, resistance to fear responses being extinguished, the development of depression and anxiety (Callaghan & Richardson, 2011), and vulnerability to physical illnesses (Shonkoff et al., 2009). In fact, childhood adversity has been associated with premature death, and among individuals who experienced two or more traumas, the death rate prior to the age of 50 increased by about 60%, even after controlling for education, social class, alcohol and tobacco consumption, and psychological disorders (Kelly-Irving et al., 2013).

It's a bit puzzling that experiences in infancy or early childhood can have the profound long-term psychological effects that they do, especially as we ordinarily don't have any memories of these times of our lives. Early theorists struggled with this dilemma, finally suggesting that such memories were assigned to the unconscious, but nonetheless affected behaviors. More recent explanations include the possibility that owing to neuroplasticity or epigenetic changes, negative experiences alter the sensitivity or reactivity of neuronal processes, leading to exaggerated responses to later challenges. As described earlier, a life-time of stressors can have cumulative adverse effects that favor the development of pathological outcomes, especially if the effects of stressor experiences were 'embedded' during childhood and then exacerbated by further stressor encounters (McGowan & Szyf, 2010). Because of the brain's plasticity, early experiences are, in a sense, the seeds laid down that might bloom at later times.

Altered appraisals and coping

Stressors experienced early in life could potentially influence self-perceptions (e.g., self-blame, mastery, self-esteem) and the way individuals appraise events, as well as foster the development of warped cognitions and a negative cognitive style, ultimately affecting the coping strategies used to deal with later stressors. In this regard, instead of adopting methods that potentially could eliminate stressors, children who experienced negative early-life stressors displayed greater reliance on avoidant and emotion-focused coping or strategies characterized by risk-taking, confrontation, and the release of frustration (Compas et al., 2001; Shonkoff et al., 2009). Many facets of coping aren't well developed in children, and strong or repeated stressors may result in attempts to understand why negative experiences are happening to them. Their beliefs might then be internalized so that they become stable, and are attributed to their own shortcomings, and if these impaired appraisals and coping methods are carried into adulthood, they can affect vulnerability to pathological states.

Tolerable versus toxic challenges

Not all early-life adversities have negative long-term consequences. Whereas 'toxic' challenges (e.g., extreme poverty, psychological or physical abuse, neglect, maternal depression, parental substance abuse, and family violence) might be aligned with later emergence of psychopathology, modest ('tolerable') stressors encountered early in life could potentially facilitate learning how to appraise and cope with such events (Shonkoff et al., 2009). Tolerable stressors might also prime essential biological systems so that later challenges will engender moderate neurochemical changes that facilitate coping efforts.

Adolescence and early adulthood

Transitions from one phase of life to another call upon the ability to adapt to new circumstances and social demands. Adolescence is a phase in which enormous social changes occur; young people

have a need to ‘fit in’, find a peer group with whom they feel comfortable and that will accept them, and sexual stirrings become more prominent. These challenges are also apparent as young people move from high school to university. Old social networks and romantic relationships may be left behind and new ones formed. This is accompanied by the development of an adult-like identity, in which there’s a need for social, economic, and emotional independence, which in some instances collides with the reality of the loss of important social support systems. The resulting distress may contribute to university-aged individuals frequently experiencing clinical levels of major depression and anxiety disorders, which have been estimated as approaching 25% (Mackenzie et al., 2011). The frequency of these disorders may actually be higher as they often go undiagnosed, in part owing to shame and the fear of stigmatization. For some individuals, the transition is as seamless as it is exciting, but for many others it is destabilizing, distressing, and lonely.

Transitions are influenced by the availability of good social buffers, the individual’s connectedness, as well as personality factors (self-mastery, self-esteem). In addition, transitions to and from adolescence are also biologically driven, being accompanied by the reorganization of neuronal and hormonal systems, and stressful events during these times are apt to produce changes of certain brain neurotransmitters, as well as disturbances in the development of nerve cell growth within the hippocampus (Kovalenko et al., 2014). In rodents, the adolescent (juvenile) period is an especially sensitive one, and stressors encountered during this time have pronounced and lasting effects on vulnerability to stressor-related pathological outcomes. Is also important for rodent socialization, and social instability at this time may be particularly apt in disrupting brain development and may affect memory processes, including fear-based memories (McCormick et al., 2011). This also seems to occur in humans, as fear responses established during adolescence are difficult to overcome, and it was estimated that 75% of adult fear-related disorders have their roots in anxiety that developed at earlier ages (Uys et al., 2006).

BEING LONELY IN A CROWDED ROOM

Most people will, at one time or another, have felt isolated and lonely, but most often these feelings are fairly transient. However, when they are chronic, feelings of loneliness can be pervasive and all-encompassing, creating extreme distress and feelings of being disconnected and apart from others. Being alone and having feelings of loneliness can be adaptive and advantageous under some circumstances and in some contexts, but for a social species such as our own, loneliness is often linked to depression and fairly pronounced physical and psychological disturbances (Cacioppo et al., 2015), and among older individuals loneliness has been associated with dementia (Holwerda et al., 2014) and is a risk factor for all-cause early mortality (Luo et al., 2012).

Middle years

By the time an individual is in their middle years (35–55), they likely have established or begun to establish a family, have a job and responsibilities, and achieved a degree of contentment.

This time of life may be accompanied by good emotional regulation, practical intelligence and a sense of mastery. But, it doesn't always work out that way, and some individuals might experience health problems, including serious chronic illnesses. As well, they might have to deal with aging parents who need to be attended to, children who are a challenge, financial hardships, relationship problems, and job strain. Thus, a clash may exist between the virtues that develop with age and the downside that accompanies heavy responsibilities and other stressors. At midlife people ought to be able to see all that they've achieved, and have a sense of what they would still like to accomplish. It can be disturbing and disheartening to realize that life goals and expectancies are unmet and will continue so.

As much as it's a cliché, hardships experienced might encourage a 'mid-life crisis' in 10–25% of men and women. The individual's realization that they are aging, their physical abilities are declining, and they are trapped in an undesirable situation, may promote personal turmoil that leads to changes in personal goals, life-style, and life course (e.g., Rosenberg et al., 1999). This can amount to career and job changes, new or deeper religious experiences, seeking new creative outlets, simplification and streamlining of life, and seeking new directions. In some instances, individuals may feel trapped as a result of financial and family responsibilities, prompting a desire to escape from these responsibilities, and junking any excess baggage. Self-destructive behaviors may emerge, such as increased drug and alcohol use, irritability, the desire for a sexual affair, and generally doing things that could lead to problems for themselves and for those who depend on them.

Older age

"Old age", as the actress Bette Davis said, "ain't no place for sissies". If you believe television commercials, old age represents the 'golden years' when we no longer have to trudge to work daily, and instead can take nice walks on sandy beaches. This may be true for some individuals, but for others, aging comes with the deterioration of biological systems, leading to heart, kidney, liver, and lung diseases, endocrine-related illness (e.g., diabetes), and neurodegenerative diseases seeming to be constant threats. With age, our capacity to fight off illness is diminished, and life stressors as well as past poor life-style choices may now express themselves. Not only might this decay reflect diminished functioning of biological resources to deal with stressors, but it appears that in some instances adaptive neurobiological changes, once set in motion, tend to persist for too long. Regulatory processes to shut systems down might not be operating well, favoring the development of allostatic overload and increased vulnerability to pathology (McEwen & Gianaros, 2011).

With the emergence of illness come repeated visits to different doctors, and sometimes dehumanizing medical procedures that could potentially encourage further stress-related illness. To make things still more distressing, older individuals may experience a loss of control and independence, and have to rely on others. Difficulties in mobility means a reduction of usual social activities and contacts, and often social support systems have deteriorated owing to a loss of friends who predeceased them or moved away, and dispersal of family members who have taken employment or other opportunities elsewhere. As social networks dissipate, loneliness, which is distressing for individuals of any age, becomes chronic, thereby exacerbating illness vulnerability (Perissinotto et al., 2012).

If all of this weren't more than enough, aged individuals might experience unsupportive interactions (often being patronized, talked down to, dismissed, and made to feel invisible or made to feel like a burden) and stigmatization. Is it any surprise that depression rates in older people are as high as they are, and that drug use to treat mood problems or sleep disturbances have soared? While not intended solely for older people, Maya-Angelou fittingly wrote

Alone, all alone

Nobody, but nobody

Can make it out here alone.

COLLECTIVE AND TRANSGENERATIONAL TRAUMA

Beyond the intergenerational effects of stressors being passed on through epigenetic processes, '*collective trauma*' that had historically been experienced by a group, can be passed down across generations by word of mouth or through writings. There are many instances of cumulative emotional and psychological wounding being experienced by groups over generations, leading to profound disturbances of psychological and physical health, as we've seen among Aboriginal Peoples (Brave Heart, 2003). Among other things, collectively experienced traumas have social and psychological trajectories that can impact family and community dynamics, resulting in disturbed social functioning as well as an erosion of leadership, basic trust, social norms, morals and values (Bombay et al., 2009, 2014a).

Why would trauma experiences of forbears have such dramatic effects on their children or grandchildren? To explain this, Marion Hirsch (2001) suggested that although they hadn't witnessed the traumatic events directly, children 'remember' the experiences of their parents or grandparents in the form of narratives and images with which they grew up. Hoffman (2004) likewise indicated that verbally or through nonverbal communication, which so often is a remnant of severe trauma, the children of survivors learn from the past and fill in the blanks as necessary. The consequences of collective traumas can wane over generations, being kept in mind primarily through rituals and symbols (e.g., holidays and remembrance days), and as much as there might be the belief that the group has 'recovered', the feelings about these events may be close to the surface. If there was any hope for collective, historical trauma being pushed aside, current experiences of discrimination act as powerful reminders of the many indignities committed against their group and effectively prevent healing (Evans-Campbell, 2008; Whitbeck et al., 2004).

Beyond these influences, severe cultural trauma, such as wars as well as dislocation secondary to conflict, can have profound social repercussions, including the impoverished conditions that follow, limited care of children, disrupted education and social rules, and deterioration in the way individuals cope with later stressors (Bombay et al., 2014a, 2014b). In some instances traumatic experiences affect an individual's mental health, and the capacity to serve as a good parent may be impaired, thereby affecting health risks in their children. Unfortunately, as adults, these children may also have poor parenting skills, which will affect the next generation (Bombay et al., 2014b).

COLLECTIVE HISTORICAL TRAUMA

There's no question that traumatic events can have exceedingly negative consequences on survivors as well as on their children. But some groups were able to move forward, whereas others seemed less able to do so, and instead experienced a decline of functioning over generations. By example, the life trajectory was very different for children of Indigenous People of North America who suffered for generations at the hands of European colonizers, relative to the children and grandchildren of Holocaust survivors, whose ancestors similarly experienced multiple collective historical traumas. To be sure, the children of trauma survivors, including those of the Holocaust, were reported to be at increased risk for illnesses, such as PTSD (Yehuda et al., 2001), but in other instances they seemed to have been more resilient (Barel et al., 2010).

So, what is it that makes one set of individuals that experienced collective trauma resilient to the effects of later stressors, whereas another group might succumb to further hardships? The question itself may be inappropriate as comparisons between the collective, historical trauma experienced across groups may not be meaningful, as each trauma may be unique and each has its own consequences (Kirmayer et al., 2014). Still, at least some of the reasons for the continuing problems can hardly be missed, but fixing these is far more difficult.

Aboriginal Peoples within Canada, Australia, and the United States encountered multiple collective historical traumas, with forced attendance at Indian Residential Schools representing a recent, long-lasting, and severe event. Several generations of children (over a period of more than 100 years) were taken from their homes and housed in government- and church-run institutions where they were physically, sexually, and psychologically abused, their pride demolished, and made to feel ashamed of their culture. This was accompanied by their communities and culture being undermined, and when they eventually returned to their homes they were faced with poverty and limited child care. The residential school experience encouraged lateral violence (i.e., toward other children) that continued to be expressed once the children had left the Indian Residential Schools (Bombay et al., 2014a). The multiple adversities fostered poor community government, made much worse by short-sighted and inadequate federal government policies, planning, financing, and education, and the opportunity for proper healing wasn't realized. The net result was that life for many Aboriginal people improved only marginally, and in many communities the hardships grew progressively more alarming. In essence, the state of Aboriginal Peoples might not just be a consequence of the collective traumas that had been endured, but was compounded by subsequent poverty, mistreatment, stigma, shame, and a loss of identity.

The experiences of Jews during the Holocaust are so repugnant they can hardly be absorbed by those who weren't witness to the events. Despite these experiences, and the flagrant prejudices and unsupportive responses received, Holocaust survivors, often with support from their communities, had opportunities in new homes, and as a result they frequently thrived and flourished. The life of the children of Holocaust survivors was consequently very different from that of the Aboriginal children. For some survivors, the trauma might have made them that much more caring in regard to their children (perhaps overly-protective), and might have influenced their values, including those

relevant to social and educational issues, and they frequently reported many close friend and family relations, elevated appreciation of life, more spirituality, greater personal strength, and new priorities in life. Like Holocaust survivors themselves, their children might have engaged in behaviors that helped them find meaning and contribute to their community (Greene et al., 2012). As well, the experiences of their parents or grandparents in some fashion may have prepared them for trauma or hardened them so that they were better able to deal with trauma. It is of particular significance that having a strong social identity and being with like-minded supportive individuals might have facilitated coping (Barel et al., 2010).

The attitudes of offspring of collective historical trauma have been changing, which might give rise to better outcomes. Despite the “soul wound” created by collective trauma among Aboriginal Peoples, as Brave Heart (2003) described it, the realization of just how profound previous injustices had been has encouraged shame and humiliation to be replaced by anger and social activism so that increased collective efforts have emerged among groups to control their own destinies. Even the thought of being perceived as being diminished in some fashion is absolutely abhorrent to them. Still, the problems that had been created for Aboriginal Peoples by European colonizers have been deep and wide within some communities, so that one hardly knows where to begin in making changes. It is certain that a Band-Aid here and a bit of antiseptic there won’t get rid of a severe endemic disease.

Personality

A considerable portion of the variability regarding responses to stressors is determined by relatively fixed personality *traits* that might have developed as a result of genetic factors, socialization that occurred in early life, as well as other experiences. Some personality variables might affect the way we appraise or cope with stressors, whereas others might make us more sensitive or reactive to stressors. Just as an individual’s locus of control influenced how a failure experience might be interpreted and hence affect later behavior, some individuals, such as high risk takers, frequently tend to get into situations that create considerable distress. There are also those who seem to generate social stressors through their insecurities, depressive symptoms, or an inability to deal with uncertainty. As well, neuroticism, as defined through the Five Factor Model of personality, which largely comprises emotional instability reflected by the disposition to experience unpleasant emotions (anger, anxiety, depression, or vulnerability), is linked to a person’s stress responses (Vollrath, 2001).

Several personality factors have been identified that could determine to what extent resilience exists in the face of stressors. Individuals who approach challenging situations optimistically may have very different perspectives and realize better outcomes than do individuals who enter it with a pessimistic outlook. This has been observed in relation to health challenges, such as breast cancer in females and radical prostatectomy in men (Carver & Connor-Smith, 2010; Carver et al., 1993). Likewise, an individual’s *self-efficacy* (the belief that tasks can be accomplished and difficulties resolved through one’s own efforts) can moderate the impact of stressors on well-being. There are many additional personality factors that are relevant to how we deal with stressors, but we won’t go through these here. For the moment, the important point is that the response to stressful events may be determined by individual characteristics that are brought to any given situation.

Sex

Several illnesses are more common in women than in men. Major depression occurs about 2–3 times more often in women, varying with the subtype of depression being considered (Piccinelli, 2000). Anxiety disorders and PTSD in response to traumatic events similarly develop more readily in women (Tolin & Foa, 2006), and some physical illnesses, such as autoimmune disorders (in which the immune system attacks the self) are far more common in women than in men. Hormonal factors no doubt contribute to these differences, as do stress-related brain neurochemical alterations (Cahill, 2006). Beyond this, gender differences exist with respect to socialization processes that promote certain behavioral coping styles being adopted, and women often carry a greater load than do men, being more responsible for the home and children, as well as caregiving for other family members (e.g., aging parents). Whether it's fruit flies or humans, genetic factors, brain architecture, and behavioral/social processes might account for the gender differences in stressor-related health disturbances (Jazin & Cahill, 2010).

Despite some stress-related illnesses being more common in women than in men, the view has been expressed that women are in fact tougher and more resilient than are men (Pratchett et al., 2010). Although the gap has been declining, women still outlive men in both industrialized and non-industrialized countries. This could stem from characteristics secondary to women having two X chromosomes, or it might reflect testosterone cutting short the lives of men. Alternatively, several life-style factors, such as relatively more smoking, drinking, and eating foods that promote elevated cholesterol levels, as well as the use of poor coping strategies (internalizing rather than letting go and externalizing), may favor the male's earlier death.

INSTRUMENTS USED TO ASSESS STRESSOR EXPERIENCES, APPRAISALS AND COPING

The arsenal of tests used to assess stressful experiences, appraisals and coping methods is fairly extensive. Some procedures have been used to assess the effects of stressors and coping in response to general events, whereas others were used to evaluate the effects of specific stressors, such as abusive experiences or loss, on the development of illness. Moreover, some coping measures evaluated general coping styles, whereas others were used to assess the specific coping strategies endorsed to deal with particular types of event.

Daily hassles

Stressors can be so severe as to render individuals virtually incapacitated, but even trivial day-to-day annoying events that might appear as minor annoyances can have cumulative effects on well-being, especially if they appear against a background of powerful life challenges (Cheng & Li, 2010). You might know the distressing feeling of having to deal with a major stressor that entirely strains your psychological stamina, only to have some minor, annoying distraction raise its ugly little head, forcing you to redirect some of your psychological resources from the more important challenges. Yet it is also possible that in the context of a major chronic stressor, minor hassles might have very little effect on outcomes, perhaps because their significance seems negligible in the greater scheme (McGonagle & Kessler, 1990).

Ordinarily, juggling multiple demands might be part of an individual's repertoire, but having too many balls in the air may cause the entire act to fall apart. For those who generally are less able to deal with multiple issues concurrently, overload will likely occur more readily and hence behavioral dysfunction may evolve. Indeed, 'daily hassles' have been linked to depression, and even to irritable bowel syndrome and diabetes, although this doesn't necessarily mean that the hassles caused the pathology, as those who are already ill may be more sensitive to day-to-day annoyances (Ravindran et al., 1999).

The *Hassles and Uplifts Scale* (Kanner et al., 1981) was developed to assess the impact of daily annoyances in relation to well-being. This scale asks individuals to indicate which hassles of a fairly long list they've experienced recently, and how severe they were (e.g., social obligations, concerns about owing money, too many responsibilities, and problems with aging parents). Similar instruments were subsequently developed that focused on particular groups (e.g., caregivers) or circumstances (e.g., transition to university). These scales are fairly lengthy and broad, allowing for determination of an overall hassle score, but they can also be used to assess specific types of hassles that might provide information as to whether certain types of events are especially cogent in relation to pathology. After all, different hassles, such as those related to a partner, friend, or family member, could lead to different outcomes relative to those related to work, health, or financial strains. As an alternative to using the daily hassles scale, daily diaries can be requested of respondents in the form of brief statements or by responding to specific questions. Yet another index, the *Daily Life Experiences Checklist* (DLE), considers the desirability and meaningfulness of events that fall into several domains – work, leisure, family, friends, and financial (Stone & Neale, 1982), and might be useful in determining links between minor events and illness.

Major life stressors

Several scales were developed to assess the link between major life stressors and the development of pathology. One approach to assess the stress–pathology relationship focused on measuring the social adjustment required in response to varied life events over a prescribed time period (e.g., 6 months or 1 year) (Holmes & Rahe, 1967). Other scales were more concerned with major life stressors experienced over a set period of time, with the severity of any particular event being based on responses previously obtained from a normative group of participants (Paykel et al., 1971). Still other instruments considered particular types of stressor, such as traumatic events experienced at a particular age (e.g., the Traumatic Life Events Questionnaire; Kubany et al., 2000). As well, questionnaires have been developed to consider specific stressful events, including those related to marital and family relations (Moos & Moos, 1981), and various aspects related to the workplace (Moos, 1981).

As enlightening as the data obtained have been using these scales, in several respects the data and conclusions derived weren't entirely satisfying. These scales were based on recall of past events, and, as indicated in Chapter 2, retrospective analyses are burdened by several biases. Furthermore, evaluating the impact of stressors in relation to normative data might not provide a valid portrayal of the stressor's severity. Using the Social Readjustment Scale, for instance, 'death of a child' receives a score of 100, which is as distressing as it gets, and lower scores are given for other stressors, such as 'pregnancy' (40), 'trouble with in-laws' (29), 'changes in work hours' (20), 'revisions of personal habits' (24). The summed scores provide an index of

the stressor severity experienced by an individual. On the surface this makes sense, but what it implies is that getting pregnant, changing personal habits, altering work hours, and having issues with your in-laws might be more disturbing (or life changing) than death of one's child. The deficiencies of such questionnaires are also problematic given that they don't consider the context in which a stressor had occurred. Does divorce have the same impact when it was long expected (and desired) relative to that felt when a partner drops the other person unexpectedly and takes off with their 'office friend'?

A frequently used alternative to major life events scales has been the *Perceived Stress Scale* (Cohen et al., 1983). This is a self-report instrument that taps into several attributes of stressor experiences, particularly how unpredictable, uncontrollable, and overloaded respondents find their lives. Several variants of this scale were developed, including a 4-item version that is preferred for telephone interviews, which necessarily must be brief.

Stress interviews have been used as an adjunct or alternative to questionnaire methods. These procedures might uncover subtle features that would otherwise be missed, but they may be subject to problems of interpretation and retrospective biases, and scoring interviews might be prone to biases on the part of the investigator. Still, qualitative data may be an excellent adjunct for the quantitative information obtained from more standard rating scales and allows the researcher or clinician to identify the presence of particular stressors that may be risk factors for pathological outcomes. Qualitative measures, in general, might not be useful for comparisons between individuals, but they allow for a richer description of stressful events encountered, provided that interviewers have been appropriately trained to collect the essential information (Wethington et al., 1995).

Stressor appraisals

When individuals are asked what stressors they have previously encountered, they are essentially being asked to make an appraisal concerning what they considered stressful in their own experience. But, more specific information (e.g., severity of the experience) can be obtained through scales that explicitly assess their appraisals. One frequently used scale for this purpose is the *Stress Appraisal Measure* (SAM) (Peacock & Wong, 1990), which measures three components of primary appraisals (challenge, threat, and centrality), as well as secondary appraisals comprising the resources the individual has available to contend with a particular event.

Coping with stressors

The link between an individual's coping ability and the emergence of pathology has received considerable attention, and several coping scales were developed, each of which have their own advantages and drawbacks. The *Ways of Coping Questionnaire* (WOC) asks individuals to describe a recently encountered stressor and assesses the degree to which individuals use particular coping methods (e.g., emotion versus problem-focused strategies) in response to this event (Folkman & Lazarus, 1988). Alternative coping measures, the *Coping Orientation to Problem Experience inventory* (COPE; Carver et al., 1989) and the *Survey of Coping Profile Endorsement* (SCOPE; Matheson & Anisman, 2003), measure multiple coping strategies that fall into problem-focused coping (e.g., planning), emotion-focused coping (e.g., self-blame),

and avoidant-focused coping (e.g., denial). These questionnaires ask participants how they would cope with stressors in general (coping styles) or in response to specific events (strategies), and a variant of the SCOPE asks participants to indicate the degree to which they believed their coping method to be effective, which provides an index of secondary appraisals. In addition to these scales, several coping measures were developed that focused on specific situations (e.g., Quality of Social Support Scale) or specific illnesses (e.g., Mental Adjustment to HIV Scale, Mental Adjustment to Cancer scale).

SUMMARY

Few researchers or clinicians would argue against the notion that stressful events contribute to the emergence or exacerbation of pathology, and hinder recovery from illness. It is equally certain, however, that outcomes in any given individual would be difficult to predict given the enormous number of different types of stressor that can be experienced, many of which may vary yet again in their specific characteristics (controllability, predictability, ambiguity, uncertainty, chronicity, and previous experiences with stressors). Moreover, the response to stressors varies with age, sex, personality variables, as well as the appraisal and coping methods that individuals use. No doubt, some of these variables may interact with other factors (e.g., genetic contributions), thereby determining vulnerability to illnesses. Because individuals may differ in relation to what their weak link might be, analyses that attempt to tie stressful events to particular pathological conditions might find that although stressors increase all-cause morbidity (and mortality), the ability to predict specific illnesses might prove challenging.