The Human Stress Response: What Does Everyone Need to Know?


Like other animals, humans have formed a highly effective protective system that evolved in our original evolutionary environment when human beings lived in small groups of family members and were threatened by hungry predators. This defensive action system is a total body mobilization, driven by powerful neurochemicals that flood our brain and body. To survive, we must pay attention to any information from the environment that might help us, so many of our senses become more acute—eyes dilate, hearing improves, smells sharpen. Whenever threatened, our attention becomes riveted on the potential threat, and we become hypervigilant to what is going on in our surroundings. Peripheral details are screened out as our brain filters in only the most relevant information about the threat. This state is called “hyperarousal” (Horowitz 1986). Below the level of our conscious awareness, we choose appropriate survival-based action: fight, flight, freeze, appease. If we survive the threat, recuperation follows, which is characterized by rest and isolation, wound care, and gradual return to daily activities (van der Hart, Nijenhuis et al. 2005).

Emotions can be seen as sensitive mental radar alerting us about the significance of things that happen to us externally or within our bodies (Harber and Pennebaker 1992). This has important survival value because without emotion we would be unable to pick out important information from the myriad forms of experience and objects that surround us. Emotions automatically activate tendencies to act in preset ways that are evolutionarily designed to help us cope with environmental challenges. Fear and anger are the dominant emotions when we are under threat. Fear prepares us to flee the situation and mobilizes our protective defenses. Anger prepares us to fight an enemy. But feeling too much emotion can be fatal—our emotions are hardwired through our autonomic nervous system to such an extent that it is possible for us to die of fright. There are only four emotionally based strategies that animals have available to deal with danger: withdrawal (flight), immobility (freeze), defensive aggression (fight), or submission (appeasement) (Marks 1987). Emotions help us determine which strategy is most likely to keep us alive.

As the level of emotional and physiological arousal increases, “dissociation”—the loss of integrated function of memory, sensation, perception, and identity—may be triggered as an adaptive response to this hyperaroused state, physiologically buffering the central nervous system and the body by lowering heart rate and reducing anxiety and pain. When we are in acute danger, if we were to focus on our mortality we could easily become nonfunctional. Fear of dying would prevent us from saving ourselves. A certain amount of denial and avoidance of reality is healthy, particularly in the face of imminent death. Acute dissociation, commonly called “shock,” helps to temporarily reduce the overwhelming nature of the stress response and allows us to stay calm and function rather than experience overwhelming emotions (Van der Kolk and Fisler 1995; van der Kolk, Pecловitz et al. 1996; Bloom 2003). Additionally, since extremely heightened physiological states can be associated with sudden death, acute dissociation can be lifesaving (Selye 1973; Selye 1975). Because they are helpless and because
they dissociate more readily than adults, children who are exposed to traumatic events are particularly prone to dissociation (Putnam 1997). In a very basic way dissociation allows us to lie to ourselves, to buffer our central nervous system by parceling out just how much reality we can deal with in manageable pieces. Too much reality is sometimes simply too much to bear (Schumaker 1995).

Our capacity to think clearly changes radically when we are under stress. When we perceive that we are in danger, we are physiologically geared to take action, not to ponder and deliberate. In many situations of acute danger, it is better that we respond immediately without taking the time for complicated mental processing so that we respond almost reflexively to save our lives or to protect others. Our ability to recall data from memory, to analyze and reason, and to make decisions all may be seriously impaired under conditions of fight-flight because whatever is threatening demands our full attention. This can appear as cognitive tunnel vision, as our perceptions become narrowed and focused and we lose the background context of the situation. In this cognitive mode we are responding only to short-term goals. Problems that lie further down the road may not be anticipated, even though we would be able to anticipate future consequences if we were not stressed. In this state, we look for simple solutions and these solutions will be largely determined by emotion, not reason. There is a narrowing of the perceptual field so that it becomes more difficult to engage in complex thinking, to see interconnectedness or interrelationships between bodies of information, to develop themes and integrate information. Learning new information becomes difficult when we are very stressed. Under stress we plan less and revert to automatic reactions and rules. “Under stress, people tend to do what they know best rather than what would be best” (p. 109) (St. Pierre, Hofinger et al. 2007).

Decision-making abilities change as a consequence of these stress-related changes in mental processing. Under these conditions, our decisions tend to be based on impulse and on whatever will immediately lower tension and fear. As a consequence these decisions are likely to be inflexible, oversimplified, directed towards action, and often are very poorly constructed (Janis 1982). We stop being able to think creatively and become more dogmatic, focusing on solutions to problems that have worked in the past rather than trying something new. There is often an increase in cautiousness, perseveration, and stereotyped thinking, and an unwillingness to question the existing status quo (Caine and Caine 1994).

Our method for remembering things, processing new memories, and accessing old memories is radically changed when under acute stress. Although our cognitive function may be oriented entirely toward the present emergency, our associational brain guarantees that we can make hundreds, even thousands of associations to any event, and the more dangerous the event, the more likely that we will make a multitude of interconnected associations. A growing body of evidence indicates that there are actually two different memory systems in the brain—one for verbal learning and remembering that is based on words, and another that is nonverbal.

The memory we consider our “normal” memory is a system based largely on language. Under normal conditions, the two kinds of memory function in an integrated way. Our verbal and nonverbal memories are thus usually intertwined and complexly interrelated. However, the human verbally based memory system is particularly vulnerable to high levels of stress. Like our
animal ancestors who lacked verbal communication, we become less attentive to words and far more focused on threat-related signals in the environment—all of the nonverbal content of communication. As fear rises, we may lose language functions altogether, possibly mediated by the effect of rising levels of cortisol on the language centers of the brain (Van der Kolk and Fisler 1995; Van der Kolk 1996; McEwen and Magarinos 1997; Roozendaal, Quirarte et al. 1997).

Without words, the mind shifts to a mode of cognition characterized by visual, auditory, olfactory, and kinesthetic images, physical sensations, and strong emotions. This system of processing information is adequate under conditions of danger because it is a more rapid method for assimilating information. By quickly providing data about the circumstances surrounding the danger and making rapid comparisons to previous experience, people may have a vastly increased possibility of survival in the face of threat. Later, traumatic memories may be triggered by any reminder of the previous threat experience (Van der Kolk 1996).

Communication with others of our kind is likely to immediately increase under threat as we try to convey messages about the immediate danger. We are a social species and part of the stress response is to call out to others as a warning and to solicit help (Van der Kolk 1987). The alarm call is evident in all primate species and the crying of a child can be so persistent and arousing (as anyone knows who has been on a small airplane with a crying infant) because the crying is itself an alarm response alerting parents that a helpless child is in danger. Communication richness and complexity, however, are reduced under these conditions. Rumors fly and information is spontaneously and rapidly conveyed verbally and nonverbally under conditions of threat. We perceive someone else’s threat responses without even knowing it—body posture, erect hair follicles, the smell of fear. During times of immediate danger, we are likely to put aside conflicts with each other in favor of individual and group survival. The feeling of well-being with the group we are affiliated with is enhanced while danger is located in an external source.

This state of extreme “hyperarousal” serves a protective function during an emergency, preparing us to respond rapidly to any perceived threat, preferentially steering us toward action and away from the time-consuming effort of thought and language. Taking action appears to be the only solution to this extraordinary experience of tension. As a result, we respond today with a response that compels us to act on our impulses to aggressively defend ourselves or to run away, even when the threat may be one to our self-esteem, not to our physical well-being.

Animals and children that are defenseless against a predator may automatically adopt a different strategy in the face of threat—the freeze component of the stress response, like a deer in the headlights—and only when the immediate danger has passed are they able to release the tension by running away. If an adult, particularly an adult male, freezes in the face of threat, the consequences for later self-appraisal can be very negative. Appeasement is an innate strategy that many young animals employ to deal with fear aroused by a larger and more dominant and dangerous animal of their own kind in all hierarchical species.

Recently another strategy has been recognized in primates and humans, particularly among females, called “tend and befriend,” that holds out significant hope for the survival of the human
species, an inclination to address the threatening other with an offer of something they might want and which would therefore change the emotional dynamic away from immediate danger, while allowing the threatening other to remain in control of the situation (Taylor, Klein et al. 2000). Research suggests that, by virtue of differential parental investment, female stress responses have selectively evolved to maximize the survival of self and offspring. As a result, females are more likely to respond to stress by nurturing offspring, exhibiting behaviors that protect them from harm and reducing neuroendocrine responses that may compromise the health of their offspring (the tending pattern), and by befriending, namely, affiliating with social groups to reduce risk. Researchers of social animals and humans hypothesize that females create, maintain, and utilize social groups, especially relations with other females, to manage stressful conditions and that these attachment processes chemically counteract the negative impact of the stress hormones (Taylor, Klein et al. 2000).

As a result of the automatic emotional and arousal systems that we have described, the end result is that we either survive the experience and gradually calm down, or not. Animals in the wild, who may be routinely threatened by predators, do not appear to develop posttraumatic stress, presumably because the brain systems that prepare them for action are effective, they do take action, and they survive to meet another day. The situation is quite different, however, for animals and for us, when the threat is repeated, and when no survival action is possible.

References


