



Stress And Health: Psychological, Behavioral, and Biological Determinants

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Abstract:

Stressors have a major influence upon mood, our sense of well-being, behavior, and health. Acute stress responses in young, healthy individuals may be adaptive and typically do not impose a health burden. However, if the threat is unremitting, particularly in older or unhealthy individuals, the long-term effects of stressors can damage health. The relationship between psychosocial stressors and disease is affected by the nature, number, and persistence of the stressors as well as by the individual's biological vulnerability (i.e., genetics, constitutional factors), psychosocial resources, and learned patterns of coping. Psychosocial interventions have proven useful for treating stress-related disorders and may influence the course of chronic diseases.

Education is a powerful tool that shapes the minds and futures of individuals and societies. It's like a bright light that chases away the darkness of ignorance, opening doors to knowledge and understanding. From the moment a child learns to read and write, education begins its transformative

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Introduction:

Claude Bernard (1865/1961) noted that the maintenance of life is critically dependent on keeping our internal milieu constant in the face of a changing environment. Cannon (1929) called this "homeostasis." Selye (1956) used the term "stress" to represent the effects of anything that seriously threatens homeostasis. The actual or perceived threat to an organism is referred to as

the "stressor" and the response to the stressor is called the "stress response." Although stress responses evolved as adaptive processes, Selye observed that severe, prolonged stress responses might lead to tissue damage and disease.

**Psychological Aspects of Stress:
Stressors during Childhood and Adolescence and Their Psychological Sequelae:**

The most widely studied stressors in children and adolescents are exposure to violence, abuse (sexual, physical, emotional, or neglect), and divorce/marital conflict (see Cicchetti 2005). McMahon et al. (2003) also provide an excellent review of the psychological consequences of such stressors. Psychological effects of maltreatment/abuse include the dysregulation of affect, provocative behaviors, the avoidance of intimacy, and disturbances in attachment (Haviland et al. 1995, Lowenthal 1998). Survivors of childhood sexual abuse have higher levels of both general distress and major psychological disturbances including personality disorders (Polusny & Follett 1995). Childhood abuse is also associated with negative views toward learning and poor school performance (Lowenthal 1998). Children of divorced parents have more reported antisocial behavior, anxiety, and depression than their peers (Short 2002). Adult offspring of divorced parents report more current life stress, family conflict, and lack of friend support compared with those whose parents did not divorce (Short 2002). Exposure to nonresponsive environments has also been described as a stressor leading to learned helplessness (Peterson & Seligman 1984). Studies have also addressed the psychological consequences of exposure to war and terrorism during childhood

(Shaw 2003). A majority of children exposed to war experience significant psychological morbidity, including both post-traumatic stress disorder (PTSD) and depressive symptoms. For example, Nader et al. (1993) found that 70% of Kuwaiti children reported mild to severe PTSD symptoms after the Gulf War. Some effects are long lasting: Macksound & Aber (1996) found that 43% of Lebanese children continued to manifest post-traumatic stress symptoms 10 years after exposure to war-related trauma.

Variations in Stress Responses:

Certain characteristics of a situation are associated with greater stress responses. These include the intensity or severity of the stressor and controllability of the stressor, as well as features that determine the nature of the cognitive responses or appraisals. Life event dimensions of loss, humiliation, and danger are related to the development of major depression and generalized anxiety (Kendler et al. 2003). Factors associated with the development of symptoms of PTSD and mental health disorders include injury, damage to property, loss of resources, bereavement, and perceived life threat (Freedy et al. 1992, Ironson et al. 1997, McNally 2003). Recovery from a stressor can also be affected by secondary traumatization (Pfefferbaum et al. 2003). Other studies have found that multiple facets of stress that may

work synergistically are more potent than a single facet; for example, in the area of work stress, time pressure in combination with threat (Stanton et al. 2001), or high demand in combination with low control (Karasek & Theorell 1990).

Acute Stress Responses:

Following the perception of an acute stressful event, there is a cascade of changes in the nervous, cardiovascular, endocrine, and immune systems. These changes constitute the stress response and are generally adaptive, at least in the short term (Selye 1956). Two features in particular make the stress response adaptive. First, stress hormones are released to make energy stores available for the body's immediate use. Second, a new pattern of energy distribution emerges. Energy is diverted to the tissues that become more active during stress, primarily the skeletal muscles and the brain. Cells of the immune system are also activated and migrate to "battle stations" (Dhabar & McEwen 1997). Less critical activities are suspended, such as digestion and the production of growth and gonadal hormones. Simply put, during times of acute crisis, eating, growth, and sexual activity may be a detriment to physical integrity and even survival.

Stress hormones are produced by the SNS and hypothalamic-pituitary adrenocortical axis. The SNS stimulates

the adrenal medulla to produce catecholamines (e.g., epinephrine). In parallel, the paraventricular nucleus of the hypothalamus produces corticotropin releasing factor, which in turn stimulates the pituitary to produce adrenocorticotropin.

Adrenocorticotropin then stimulates the adrenal cortex to secrete cortisol. Together, catecholamines and cortisol increase available sources of energy by promoting lipolysis and the conversion of glycogen into glucose (i.e., blood sugar). Lipolysis is the process of breaking down fats into usable sources of energy (i.e., fatty acids and glycerol; Brindley & Rollan 1989). Energy is then distributed to the organs that need it most by increasing blood pressure levels and contracting certain blood vessels while dilating others. Blood pressure is increased with one of two hemodynamic mechanisms (Llabre et al. 1998, Schneiderman & McCabe 1989). The myocardial mechanism increases blood pressure through enhanced cardiac output; that is, increases in heart rate and stroke volume (i.e., the amount of blood pumped with each heart beat). The vascular mechanism constricts the vasculature, thereby increasing blood pressure much like constricting a hose increases water pressure. Specific stressors tend to elicit either myocardial or vascular responses, providing evidence of situational stereotypy (Saab

et al. 1992, 1993). Laboratory stressors that call for active coping strategies, such as giving a speech or performing mental arithmetic, require the participant to *do* something and are associated with myocardial responses. In contrast, laboratory stressors that call for more vigilant coping strategies in the absence of movement, such as viewing a distressing video or keeping one's foot in a bucket of ice water, are associated with vascular responses. From an evolutionary perspective, cardiac responses are believed to facilitate active coping by shunting blood to skeletal muscles, consistent with the fight-or-flight response. In situations where decisive action would not be appropriate, but instead skeletal muscle inhibition and vigilance are called for, a vascular hemodynamic response is adaptive. The vascular response shunts blood away from the periphery to the internal organs, thereby minimizing potential bleeding in the case of physical assault.

Discussion:

Inflammation, the Immune System, and Physical Health:

Despite the stress-mediated immunosuppressive effects reviewed above, stress has also been associated with exacerbations of autoimmune disease (Harbuz et al. 2003) and other conditions in which excessive inflammation is a central feature, such

as CHD (Appels et al. 2000). Evidence suggests that a chronically activated, dysregulated acute stress response is responsible for these associations. Recall that the acute stress response includes the activation and migration of cells of the innate immune system. This effect is mediated by proinflammatory cytokines. During periods of chronic stress, in the otherwise healthy individual, cortisol eventually suppresses proinflammatory cytokine production. But in individuals with autoimmune disease or CHD, prolonged stress can cause proinflammatory cytokine production to remain chronically activated, leading to an exacerbation of pathophysiology and symptomatology.

Conclusion:

Stress is a central concept for understanding both life and evolution. All creatures face threats to homeostasis, which must be met with adaptive responses. Our future as individuals and as a species depends on our ability to adapt to potent stressors. At a societal level, we face a lack of institutional resources (e.g., inadequate health insurance), pestilence (e.g., HIV/AIDS), war, and international terrorism that has reached our shores. At an individual level, we live with the insecurities of our daily existence including job stress, marital stress, and unsafe schools and neighborhoods.

These are not an entirely new condition as, in the last century alone, the world suffered from instances of mass starvation, genocide, revolutions, civil wars, major infectious disease epidemics, two world wars, and a pernicious cold war that threatened the world order. Although we have chosen not to focus on these global threats in this paper, they do provide the backdrop for our consideration of the relationship between stress and health.

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