

SUPPLEMENTARY MATERIAL

Kindling hypothesis and sensitizing effect

The kindling model is a non-homologous basic science model of the relationship between psycho-social stress and the course of affective disorders.¹ The theory is rooted in preclinical studies in which the electrophysiological input needed to elicit seizure activity in rodents progressively declined (“kindling”), whereas rodents developed a behavioral sensitization to stimulant administration (“sensitization”). The kindling hypothesis thus states that initial episodes are likely triggered by major life events (stressors), but that successive episodes grow increasingly more autonomous.

Based on this model, life stressors may leave long-term vulnerabilities, thereby lowering the threshold of stress exposure required for episode recurrence, so that, over time, relatively minor stressors may trigger a mood episode.

Later researchers have hypothesized two separate processes through which the relationship between stressors and mood episodes is reduced over time, namely the stress sensitization and the stress autonomy models.² The stress sensitization model suggests that individuals become increasingly sensitized to stressful events such that stressors that may not have been severe enough to trigger an initial mood episode onset would later be able to trigger a recurrent episode. One way to examine whether the threshold for a mood episode is lower is to assess the number of stressors that precede its onset. In this way, individuals who are sensitized would experience a greater frequency of minor events but a lower frequency of major events prior to new recurrent episodes, and increased impact of both minor and major events before a new episode. Whereas both major and minor stressors would trigger recurrent mood episodes, the frequency of minor events would be more likely to elicit a new episode over time. That is, prior mood episodes do not cause fewer events to occur before a new mood episode onset; rather, higher numbers of previous episodes lower the threshold for new episodes, so that episodes occur sooner. In contrast, the stress autonomy model suggests that subsequent mood episodes will be less tied to input from the environment, and thus, both major and minor stressors would become less associated with progressive episodes over time.

Steeling effect

In some circumstances, the experience of stress or adversity sometimes strengthens resistance to later stress—a so-called “steeling” effect.³ There is a U-shaped association between life stress and development of resilience, in which low stress and high stress do not produce resilience but moderate stress does.⁴ There are some parallels between the steeling effect and traditional, pathological views on the effects of stress (Cumulative risk model), as both approaches suggest that the worst outcomes will be seen in the individuals who have experienced the most stress. However, the steeling effect differs from the cumulative risk model as it suggests that the best outcomes will be seen not in individuals with no experiences of stress, but rather in those with a “moderate” level of stress. Moderate stress is proposed to be optimal as the distressing event is perceived to be sufficiently challenging so that resilience resources can be successfully applied, practiced, and further improved. This in turn heightens the resistance to future stress and protects well-being.

Stress inoculation theory

Stress inoculation theory⁵ was similar with steeling effect, limited exposure to stressors—with opportunity for recovery in between—can “toughen” individuals. Toughness results in psychological and physiological changes that make people more likely to perceive stressful situations in general as manageable (rather than overwhelming) and to cope effectively with them. Importantly, both sheltering from all stressors and continuous exposure to stressors should fail to develop toughness. This parallels the development of physical fitness from aerobic exercise: Just as the body requires exertion to improve fitness, there is no opportunity for toughness to develop if someone has never coped with stress; likewise, physical overexertion can be harmful, and too much stress disrupts toughening. Stress-inoculation is used in posttraumatic stress disorder interventions to foster recovery following potentially traumatizing events and build resilience to future stressors by providing controlled exposure to distressing content in a therapeutic context.⁶

REFERENCES

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