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Threat Sensitivity

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Synonyms

Anxious arousal; Anxiety sensitivity; Hypervigilance; Threat bias

Definition

Threat sensitivity refers to affective, cognitive, behavioral, and physiological responses toward threatening (likely to cause damage or danger) stimuli, information, or cues. Threat may be actual, perceived, or potential. Metrics of threat sensitivity capture the degree to which an individual shows heightened arousal and preparedness before, during, or following interactions with the aversive stimulus. Although humans rely on the ability to detect, attend to, and respond to threat (fight/flight) for survival, exaggerated threat sensitivity can be maladaptive. For example, sustained threat sensitivity is thought to contribute to clinical anxiety- and stressor-related disorders such as post-traumatic stress disorder.

Introduction

Jeffrey Gray, a British psychologist and personality theorist, proposed two distinct neurological systems that regulate an individual's sensitivity to either aversive (behavioral inhibition system; BIS) or appetitive (behavioral activation system; BAS) environmental cues (Gray 1978). The behavioral inhibition system (BIS) underlies the regulation of aversive motives, or goal states related to the presence of something unpleasant, feared, or novel, and thus drives inhibition of behavior toward such aversive cues. The BIS neural network also detects signals of and inhibits behavior toward punishment. The BIS controls physical and emotional responses to aversive cues via the septohippocampal system and monoaminergic projections extending from the brain stem to the temporal and frontal lobes, which regulate activity of the amygdala. The physical sensations associated with threat sensitivity include rapid heart rate, sweating, and heightened sensory awareness and are the result of a cascade of physiological events controlled by the autonomic nervous system such as tachycardia, pupil dilation, skin conductance, and cortisol release.

Carver and White (1994) created the BIS/BAS scales as an empirically validated self-report measure of individual differences in the activation of

V. Zeigler-Hill, T.K. Shackelford (eds.), *Encyclopedia of Personality and Individual Differences*,
https://doi.org/10.1007/978-3-319-28099-8_869-1

both systems. Examples of the seven items on the BIS scale designed to detect threat sensitivity include "I worry about making mistakes" and "If I think something unpleasant is going to happen I usually get pretty worked up." Individuals are asked to provide a rating from 1 to 4 of how accurate each statement describes them with 4 being the least accurate. Over 20 years of research has shown that the BIS scale has been correlated with increased gray matter volume in the amygdala (Barros-Loscertales et al. 2006) and enhanced neural processing of emotional faces (Dennis and Chen 2007).

Cognitive factors involved in threat sensitivity have also been widely investigated. Stemming from earlier theories of the role of dysregulated attention toward threat in anxiety (e.g., Eysenck and Calvo 1992), decades of research have linked the attentional threat bias to anxiety (Matthews and MacLeod 2002). The attentional threat bias is often defined as selective and exaggerated attention toward threat but may comprise several components of dysregulated attention, including vigilance, difficulty disengaging, and avoidance of threat (Roy et al. 2015). When stimuli signifying threat compete for attention, the attentional threat bias can be expressed as either a selective attention toward threat or as attentional avoidance or lability. These variable and state-dependent attentional patterns promote anxious arousal and enhanced stress reactivity. A novel treatment approach for anxiety directly targets attentional threat bias by systematically training attention away from threat, called attention bias modification training (ABMT). Current research focuses on the efficacy and effectiveness of ABMT, individual differences in treatment response, identification of biobehavioral mechanisms underlying its salutary effects on anxiety and stress, and alternative delivery methods for ABMT such as mobile applications (Dennis and O'Toole 2014).

In addition to behavioral metrics of attentional threat bias, brain-imaging measures such as functional magnetic resonance imaging (fMRI) and event-related potentials (ERPs) have been used to identify discrete neurocognitive processes that may underlie the attentional threat bias, including earlier stimulus-driven changes in attentional processing and later executive cognitive control processes (Eldar and Bar-Haim 2010). For example, several fMRI studies have pointed to altered prefrontal cortex and anterior cingulate cortex activity as a result of behavioral interventions such as ABMT (for review, see Browning et al. 2010).

Conclusion

Threat sensitivity is a multidimensional construct that describes physiological, cognitive, affective, and behavioral responses to aversive stimuli that signify threat. High levels of threat sensitivity are associated with psychological distress, most consistently with anxiety-, trauma-, and stressor-related disorders.

Cross-Reference

► Anxiety

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