



Sensation seeking and startle modulation by physically threatening images

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Abstract

The potential moderating effect of sensation seeking on anxious reactivity to threatening experiences was assessed using the affective modulation of startle-blink paradigm. Startle blinks, as measured by electromyographic (EMG) activity in response to loud (100 dB) white-noise stimuli, were elicited during the presentation of positive, neutral, and threatening visual images. Unlike participants low in sensation seeking who showed blink potentiation during threatening versus neutral images, participants high in sensation seeking showed equal magnitudes of startle to neutral and threatening images. The results suggest that individuals high compared with low on sensation seeking are less anxiously reactive to physically threatening visual stimuli. No attenuation in startle magnitude was elicited by positive images among low or high sensation seekers suggesting that the positive images employed in the current study were not arousing enough to activate the appetitive arousal system.

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1. Introduction

Sensation seeking is a dimension of personality referring to both an individual's need for sensory stimulation and the level of risk taken in an effort to satisfy the need

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for such stimulation (Zuckerman, 1994). It has been found to buffer individuals from stress associated with physically threatening events such as sports-related injury (Smith et al., 1992) and skydiving (Breivik et al., 1998). Additionally, sensation seeking has been found to play a stress-buffering role for individuals enduring military combat. For example, Solomon et al. (1995) found lower rates of posttraumatic stress disorder (PTSD) and less severe psychiatric symptomatology among high relative to low sensation-seeking Israeli POWs of the Yom Kippur War (Solomon et al., 1995). Similarly, in a reanalysis requested by the current authors, Orr et al. (1990) found a significant negative correlation (-0.32) between the thrill and adventure seeking subscale (TAS) of the sensation seeking scale (SSS) and trait anxiety among Vietnam veterans (S.P. Orr, personal communication, May 11, 1999) indicating lower levels of post-war trait anxiety among those higher on the TAS subscale.

The factors responsible for the potential stress-buffering function of sensation seeking remain relatively unstudied. One possibility is that high sensation seekers are less anxiously reactive to physical threat, which in turn facilitates resilient adaptation. This idea is supported by several studies demonstrating inverse relations between sensation seeking and self-reported anxious reactivity to physically risky activities and situations (Blankstein, 1975; Franken et al., 1992; Segal, 1973; Zuckerman, 1979). This idea is also consistent with findings that high relative to low sensation seekers are less responsive to appeals for safe sex and drug prevention that include threatening health information for persuasive purposes (Schoenbachler and Whittler, 1996; Witte and Morrison, 1995). The above studies provide correlational support for an inverse relationship between sensation seeking and anxious reactivity to threat. The current study aims to investigate experimentally this relationship using the affective modulation of startle paradigm (Vrana et al., 1988).

Affective modulation of startle refers to the tendency for negative affective states (e.g. anxiety and disgust) and positive affective states (e.g. joy and lust) to potentiate and attenuate the startle response, respectively. Such modulation of the startle blink has been obtained by presenting positive, neutral, or negative pictures from a standardized collection of images known as the International Affective Picture System (Lang et al., 1988) to subjects just prior to the onset of an auditory startle stimulus (for a review, see Bradley et al., 1999). Given that startle is augmented best by physically threatening IAPS images (Balaban and Taussig, 1994), potentiated-startle may be a particularly sensitive index of emotional reactivity to threat, making affective startle modulation an ideal paradigm for the research question at hand.

The potentiation elicited by negatively-valenced stimuli has been understood as a fear reaction and has, therefore, been referred to as fear-potentiated startle (e.g. Grillon et al., 1993; Grillon and Ameli, 2001). Evidence for this interpretation comes from studies showing that potentiation of startle resulting from negative stimuli in humans is attenuated by diazepam, an anxiolytic drug (Bitsios et al., 1999; Patrick et al., 1996). Similarly in animal studies, rats administered drugs that decrease anxiety in humans (e.g. diazepam and flurazepam) display reduced levels of fear-potentiated startle, and rats administered drugs that increase anxiety in humans (e.g. piperoxan and yohimbine) show elevated levels of fear-potentiated startle (Davis, 1979; Davis

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