



Distraction/Suppression and Distress Endurance diminish the extent to which generalized conditioned fear is associated with maladaptive behavioral avoidance



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ABSTRACT

A central conditioning correlate of clinical anxiety is the over-generalization of Pavlovian fear to safe stimuli resembling conditioned danger cues (CS+). Though much of the pathogenic influence of such generalization may lie in the unnecessary behavioral avoidance it evokes, few studies have examined maladaptive avoidance associated with Pavlovian generalization. Lab-based assessments of this process, here referred to as instrumental avoidance from Pavlovian generalization (IAP-G), have recently begun. The current study represents a next step in this line of work by examining personality factors that may reduce maladaptive IAP-G. This is a clinically relevant effort, as such traits may reflect resilience factors, with high levels reducing the likelihood of maladaptive generalized avoidance following Pavlovian generalization. Here we focus on the effects of Distraction/Suppression (DS) and Distress Endurance (DE) on IAP-G. Results indicate that both DS and DE moderate IAP-G by weakening relations between Pavlovian generalization of fear-potentiated startle and maladaptive generalized avoidance. Further, moderating effects of DS were most pronounced for more ambiguous cues of threat (i.e., stimuli moderately resembling CS+), while moderating effects of DE were most pronounced for more certain cues of threat (i.e., stimuli highly resembling CS+, as well as the CS + itself). Results implicate DS and DE as protective factors against the maladaptive behavioral consequences of Pavlovian generalization, and further indicate that the protective influence of these traits may depend on the ambiguity of the threat at hand.

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Fundamental to Pavlovian fear conditioning is its generalization to stimuli resembling learned danger cues (Mackintosh, 1974; Pavlov, 1927). Specifically, Pavlovian fear transfers from the conditioned danger cue (CS+), originally paired with the aversive unconditioned stimulus (US), to other stimulus events sharing features with the CS+. In its adaptive form, generalization of Pavlovian fear supports the application of what is learned from past threatening encounters to future resembling encounters, in the service of optimizing defensive reactions. In its more maladaptive instantiation, fear is excessively generalized to benign stimulus

events with inconsequential resemblance to the original threatening encounter, resulting in fear responding in the absence of any genuine danger. Such over-generalization is widely viewed as an important conditioning correlate of pathologic anxiety (e.g., Foa, Steketee, & Rothbaum, 1989; Lissek & Grillon, 2012; Mineka & Zinbarg, 1996, 2006; Watson & Rayner, 1920) through which anxiety cues are unduly proliferated in the individual's environment. Furthermore, recent lab-based studies applying systematic methods for assessing Pavlovian fear generalization have confirmed over-generalization in PTSD (Kaczurkin et al., 2017), panic disorder (Lissek et al., 2010), and generalized anxiety disorder (Cha et al., 2014; Greenberg, Carlson, Cha, Hajcak, Parodi, 2013; Lissek et al., 2014), implicating such over-generalization as a cross-diagnostic feature of the anxiety disorders.

Though Pavlovian over-generalization of fear is a key correlate of clinical anxiety, its pathogenic potential may further derive from the maladaptive instrumental avoidance elicited by such fear. That is, Pavlovian generalization of fear motivates decisions to avoid

Abbreviations: CS+, conditioned danger cue; CS-, conditioned safety cue; GS, generalization stimulus; IAP-G, instrumental avoidance from Pavlovian generalization; IAP-CS+, instrumental avoidance from Pavlovian responses to CS+; DS, Distraction/Suppression; DE, Distress Endurance.

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stimulus events that resemble learned danger cues, but are not in actuality predictive of anything aversive. This *instrumental avoidance from Pavlovian generalization* (IAP-G) is maladaptive when it leads to unnecessary avoidance of safe situations that inconspicuously resemble danger cues, at the cost of impaired social, educational, or occupational functioning.

Though IAP-G is an important candidate path to the maladaptive avoidance centrally implicated in clinical anxiety (American Psychiatric Association, 2013), only three experiments to date have examined IAP-G in humans (Arnaudova, Krypotos, Effting, Kindt, & Beckers, 2016; Lommen, Engelhard, & van den Hout, 2010; Van Meurs, Wiggert, Wicker, & Lissek, 2014). Furthermore, the only IAP-G study eliciting generalized avoidance responses that are maladaptive, by virtue of an unnecessary cost incurred when avoiding safe stimuli, was recently completed in our group using a novel Pavlovian-instrumental generalization experiment (PIG paradigm: Van Meurs, Wiggert, Wicker, & Lissek, 2014). Here, maladaptive avoidance is defined as behavioral avoidance during safe cues that resemble the CS+ (i.e., generalization stimuli [GS]), which unnecessarily compromises performance on the video game in which the PIG paradigm is embedded. Specifically, in this video game, participants who choose to avoid during GSs, do so at the cost of reduced probability of winning the game, and do so unnecessarily since the GSs are not actually predictive of shock. The unnecessary cost incurred by avoidance during GSs serves as a lab-based analogue of real world impairment due to unnecessary avoidance seen in anxiety patients. Results from the PIG paradigm indicate that higher levels of Pavlovian generalization of fear-potentiated startle and generalization of perceived risk of shock are each associated with higher levels of maladaptive generalized avoidance (Van Meurs et al., 2014), indicating that Pavlovian generalization confers risk for maladaptive avoidance.

The current study extends this line of work by applying the PIG paradigm to assess personality factors that may moderate the extent to which Pavlovian fear generalization is associated with maladaptive, generalized avoidance. This is a clinically relevant effort, as trait factors that increase IAP-G may confer risk for clinical anxiety by increasing the likelihood of maladaptive behavioral outcomes following Pavlovian fear generalization. Conversely, trait factors reducing IAP-G may be protective, with high levels of such traits reducing the likelihood of maladaptive generalized avoidance following Pavlovian generalization of fear. In the current paper we focus on the Distress Endurance (DE) and Distraction Suppression (DS) aspects of the Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011) as potential moderators of IAP-G. This focus was prompted by preliminary evidence that DS and DE are associated with reduced levels of maladaptive generalized avoidance (Van Meurs et al., 2014). Because the MEAQ was designed to measure coping responses to distress rather than distress itself, the inverse relations between DS/DE and generalized avoidance may reflect that such trait dispositions allow one to cope with distress from Pavlovian generalization in ways that reduce the likelihood of maladaptive generalized avoidance, leading to a moderation effect of DS/DE on IAP-G. Though preliminary analyses of these data indicated non-significant moderating effects of DS and DE on IAP-G, such effects were in the expected direction (both DS and DE were negative moderators). Because individual differences in IAP-G were not a main focus in Van Meurs et al. (2014), and because the non-significance of DS/DE moderator effects could have been due to the small sample size ($N = 44$), the current study was undertaken to re-assess DS and DE as moderators of IAP-G in a larger sample of participants ($N = 109$).

1. Theoretical rationale for the predicted moderating effects of DS and DE on IAP-G

1.1. Distraction suppression as a moderator of IAP-G

Distraction Suppression (DS) reflects the disposition to cope with distress through attempts to suppress, or distract oneself from distress-related emotions and cognitions (e.g., “When something upsetting comes up, I try very hard to stop thinking about it”). Though some studies find positive relations between suppression and psychopathology (Muris & Merckelbach, 1997; Muris, Merckelbach, & Horselenberg, 1996; van den Hout, Merckelbach, & Pool, 1996), recent meta-analytic work implicates distraction and suppression as effective ways of regulating emotional expression (Webb, Miles, & Sheeran, 2012), a notion supported by the fact that DS is the MEAQ aspect most positively related to self reported emotion regulation (Gámez et al., 2011). Furthermore, DS may reflect an adaptive facility for attentional disengagement from threat-related stimuli, an ability repeatedly shown to be compromised among those high on anxiety (e.g., Fox, Russo, & Dutton, 2002; Yiend & Mathews, 2001). Thus those high on DS may be able to reduce the distress evoked by Pavlovian generalization through either disengaging attention from generalization stimuli, or suppressing anxiety-related emotions and cognitions prompted by generalization stimuli, and thereby reduce their likelihood of resorting to avoidance to reduce such distress.

1.2. Distress Endurance as a moderator of IAP-G

Distress Endurance (DE) reflects the inclination to persevere in the face of distress and discomfort (e.g., “Fear or anxiety won’t stop me from doing something important”, “I won’t quit when things get difficult”), and, together with other highly related trait constructs (e.g., Distress Tolerance: Simons & Gaher, 2005) has been shown to inversely relate to a number of anxiety disorder severity measures (Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010). DE may moderate IAP-G by increasing the individual’s willingness to endure the Pavlovian fear elicited by generalization stimuli, leading to a lowered probability of avoiding during presentations of such stimuli.

2. Additional questions of interest

Though the central focus of the present paper is testing moderating effects of DS and DE on IAP-G, additional goals of the current paper include: 1) testing whether relations between DS/DE and generalized avoidance are mediated by levels of Pavlovian generalization, 2) determining whether effects of DS/DE on IAP-G persist after controlling for levels of global trait anxiety, and 3) extending assessment of DS/DE effects on IAP-G to the more adaptive instrumental avoidance from Pavlovian fear to genuine danger. Below we describe each of these additional goals.

2.1. Pavlovian generalization as a mediator of relations between DS/DE and generalized avoidance

Though previously found inverse relations between DS/DE and generalized avoidance found by Van Meurs et al. (2014) could reflect the centrally hypothesized moderating effects of DS/DE on IAP-G, such relations could also be mediated by reduced levels of Pavlovian fear generalization among those higher on DS/DE, resulting in reduced motivation for generalized avoidance. That is, reduced generalized avoidance among those high on DS and DE could be mediated by effects of these personality factors on levels of distress to GSs rather than their effects on avoidance-based coping

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