Evaluating emotional sensitivity and tolerance factors in the prediction of panic-relevant responding to a biological challenge

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ABSTRACT

The current study investigated anxiety sensitivity, distress tolerance (Simons & Gaher, 2005), and discomfort intolerance (Schmidt, Richey, Cromer, & Buckner, 2007) in relation to panic-relevant responding (i.e., panic attack symptoms and panic-relevant cognitions) to a 10% carbon dioxide enriched air challenge. Participants were 216 adults (52.6% female; M_{age} = 22.4, SD = 9.0). A series of hierarchical multiple regressions was conducted with covariates of negative affectivity and past year panic attack history in step one of the model, and anxiety sensitivity, discomfort intolerance, and distress tolerance entered simultaneously into step two. Results indicated that anxiety sensitivity, but not distress tolerance or discomfort intolerance, was significantly incrementally predictive of physical panic attack symptoms and cognitive panic attack symptoms. Additionally, anxiety sensitivity was significantly predictive of variance in panic attack status during the challenge. These findings emphasize the important, unique role of anxiety sensitivity in predicting risk for panic psychopathology, even when considered in the context of other theoretically relevant emotion vulnerability variables.

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Over the past 20 years, there has been a focused effort placed on advancing our understanding of the role of cognitive-affective vulnerability factors in the etiology and maintenance of panic psychopathology (Barlow, 2002; Beck & Clark, 1997; Clark, 1986; McNally, 2002). This work has led to a notable scientific and clinical progress both in terms of identifying cognitive-affective factors related to onset and maintenance of panic psychopathology as well as development of efficacious therapeutic approaches for such clinical problems (Barlow, 2002).

One of the most promising lines of inquiry has focused on anxiety sensitivity (Bernstein & Zvolensky, 2007; Taylor, 1999). Anxiety sensitivity is the fear of anxiety and arousal-related sensations and their consequences (Reiss & McNally, 1985). Anxiety sensitivity has been conceptualized as a relatively stable, though clinically malleable, cognitive predisposition (McNally, 2002). When anxious, individuals high in anxiety sensitivity may be more apt to become acutely fearful due to beliefs that these internal anxiety sensations have harmful personal physical, psychological, or social consequences (Fedoroff, Talor, Asmundson, & Koch, 2000; Rodriguez, Bruce, Pagano, Spencer, & Keller, 2004; Zinbarg, Barlow, & Brown, 1997). In fact, anxiety sensitivity, across numerous studies, is concurrently and prospectively associated with more severe anxiety symptoms and panic psychopathology; effects not attributable to

trait anxiety or negative affectivity (Feldner, Zvolensky, Schmidt, & Smith, 2008; Hayward, Killen, Kraemer, & Taylor, 2000; Li & Zinbarg, 2007; Maller & Reiss, 1992; McLeish, Zvolensky, & Bucossi, 2007; Schmidt, Lerew, & Jackson, 1997; Schmidt, 1999; Schmidt, Richey, & Fitzpatrick, 2006; Schmidt, Zvolensky, & Maner, 2006). Additionally, laboratory studies have consistently confirmed that anxiety sensitivity measured prior to a biological challenge paradigm is a significant predictor of post-challenge anxiety symptoms and panic attacks (Eke & McNally, 1996; Leen-Feldner, Feldner, Berstein, McCormick, & Zvolensky, 2005; Rabin, Embry, & MacIntyre, 1999; Schmidt, 1999; Zvolensky, Feldner, Eifert, & Stewart, 2001); effects, again, evident above and beyond negative affectivity and trait anxiety. Although empirical work on anxiety sensitivity has indicated that it represents a central cognitive factor in fear acquisition to interoceptive stimuli, there has been considerably less effort to integrate conceptually related work on tolerance (cf., sensitivity) of aversive stimuli, which is of theoretical relevance to models of panic psychopathology (Bernstein & Zvolensky, 2007). Such limitation is unfortunate, as anxiety sensitivity is related to distress tolerance constructs (e.g., Berstein, Zvolensky, Vujanovic, & Moos, 2009), and as discussed below, distress tolerance factors may be related to panic psychopathology (Marshall et al., 2008; Schmidt & Trakowski, 1999). Indeed, like anxiety sensitivity, distress tolerance variables may theoretically motivate avoidance and paradoxically amplify anxiety states.

Discomfort intolerance is a tolerance-related construct of particular relevance in the context of anxiety sensitivity and panic

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vulnerability. Discomfort intolerance is operationalized as individual differences in capacity to withstand *uncomfortable physical sensations* (Schmidt & Lerew, 1998; Schmidt et al., 2007; Schmidt, Richey, et al., 2006; Schmidt, Zvolensky, et al., 2006). Conceptually, discomfort intolerance may be relevant to vulnerability for panic psychopathology because persons less able to tolerate aversive physical sensations (e.g., anxious arousal) may be less able to withstand such stimuli, and therefore, escape or avoid situations (e.g., public settings) or activities (e.g., exercise) that may trigger them (Schmidt & Lerew, 1998); possibly, placing themselves at greater risk for maladaptive panic-relevant avoidance learning. Smit et al. (2006), using the Discomfort Intolerance Scale (DIS), have found that discomfort intolerance is (a) elevated among clinical samples, particularly persons with panic disorder, compared to persons without a clinical disorder; and (b) moderately concurrently and prospectively associated with measures of anxiety symptoms, with weaker associations for indices of depressive symptoms (Schmidt, Richey, et al., 2006; Schmidt, Zvolensky, et al., 2006). Discomfort intolerance has been initially explored in relation to anxious and fearful responding to laboratory stressors. For example, using a carbon dioxide enriched air (CO_2) paradigm among clinical ($n = 45$) and non-clinical ($n = 45$) samples, Schmidt and Trakowski (1999) found discomfort intolerance was significantly predictive of a greater fear response only among the non-clinical group. The lack of an effect in the clinical group may have been due to a truncated range of discomfort intolerance among that group (Schmidt & Trakowski, 1999). Other studies have found that discomfort intolerance is related to statistically significant, but small, increases in anxiety symptoms during biological challenge among non-clinical participants in a laboratory setting (Bonn-Miller, Zvolensky, & Bernstein, 2009; Schmidt et al., 2007). These data collectively suggest that discomfort intolerance may be related to anxious and fearful responding to bodily sensations, although a comprehensive examination of this construct in the context of other related tolerance factors (see subsequent paragraph), has not been completed.

Like discomfort intolerance, distress tolerance is another tolerance construct of theoretical relevance to anxiety sensitivity and panic psychopathology vulnerability (Berstein et al., 2009). Simons and Gaher (2005) conceptualize distress tolerance as an individual's ability to withstand negative psychological or *emotional* states (Simons & Gaher, 2005). Initial study has shown that distress tolerance, as measured by the Distress Tolerance Scale (DTS; Simons & Gaher, 2005), is negatively associated with measures of affective distress (negative affectivity) and dysregulation (lability). Other work has found that lower levels of distress tolerance, particularly under conditions of higher degrees of life stress, are related to greater endorsement of poor mental health outcomes (e.g., depressive symptoms; Anestis, Lazou, Pörtner, & Michaelidis, 2007; O'Cleirigh, Ironson, & Smits, 2007; Zvolensky et al., 2009). For example, Buckner, Bonn-Miller, Zvolensky, & Schmidt (2007) found that DTS scores concurrently mediated the relationship between depressive symptoms and both marijuana and alcohol use problems. Overall, distress tolerance is related to a variety of psychological symptoms. These data, although limited, highlight the potential role of distress tolerance as a risk marker for a variety of psychopathological symptoms. It is presently unclear, however, whether distress tolerance relates to anxious and fearful responding to panic-relevant bodily sensations. Theoretically, persons less capable of tolerating acute anxiety and related emotional states elicited by physiological arousal may be more apt to experience such sensations as intense and uncontrollable and thereby paradoxically amplify the anxiety.

Together, several studies suggest that anxiety sensitivity plays an important role in the experience of anxiety and panic. However, no study has directly examined anxiety sensitivity in the context of discomfort intolerance and distress tolerance in a biological challenge paradigm. Given that anxiety sensitivity is related to both discomfort intolerance (Schmidt, Richey, et al., 2006; Schmidt, Zvolensky, et al., 2006) and distress tolerance (Zvolensky et al., 2009), and both discomfort intolerance and distress tolerance are putatively related to greater risk for anxiety symptoms, there is a need for a direct test of the incremental predictive validity of anxiety sensitivity beyond these two tolerance variables, as well as the incremental predictive utility of distress tolerance and discomfort intolerance beyond anxiety sensitivity. Therefore, the primary purpose of the present investigation was to concurrently examine the predictive power of anxiety sensitivity relative to discomfort intolerance and distress tolerance in regard to panic-relevant self-reported symptoms following direct exposure to perturbation in bodily sensations. It was hypothesized that, when examined concurrently, anxiety sensitivity, but not distress tolerance or discomfort intolerance, would significantly predict DSM-IV panic attacks in the laboratory, as well as intensity of cognitive and physical panic attack sensations. These effects were expected to be evident above and beyond negative affectivity, lifetime panic attack history, and shared variance with both discomfort intolerance and distress tolerance. Our hypothesis was grounded in the large body of literature identifying AS as a unique risk factor in the pathogenesis of panic-spectrum problems; and despite their theoretical promise, the lack of strong empirical evidence to-date that distress tolerance or discomfort intolerance would account for unique variance beyond AS.

1. Method

1.1. Participants

Participants were 216 adults (52.6% female; $M_{age} = 22.4$, $SD = 9.0$) recruited from the greater Burlington, VT community via flyers and advertisements in local newspapers. The racial distribution generally reflected that of the State of Vermont (State of Vermont Department of Health, 2007), with 91.1% of the total sample identifying as Caucasian, 1.9% African-American, 1.5% Hispanic, .7% Asian, and 4.8% as Other. Approximately 42.6% of participants reported being daily smokers, averaging 13.8 ($SD = 6.9$) cigarettes per day. With regard to alcohol consumption, 75.6% reported drinking alcohol at least 2–4 times per month as measured by the Alcohol Use Disorders Identification Test (AUDIT; Babor, de la Fuente, Saunders, & Grant, 1992). Participants reported a mean alcohol consumption score (frequency-by-quantity per occasion; Stewart, Zvolensky, & Eifert, 2001) of 6.8 ($SD = 4.9$). Additionally, participants scored a mean of 9.8 ($SD = 6.42$) on the AUDIT, indicating at least moderate alcohol problems, with 63.1% meeting criteria for current alcohol use problems (i.e., scoring 8 or greater on the AUDIT; Babor et al., 1992).

Exclusionary criteria for the current study included: (1) limited mental competency or the inability to provide informed, written consent; (2) current suicidal or homicidal ideation; (3) current or past history of psychosis; (4) current (past 6-month) Axis I psychopathology (except for substance use disorders); (5) current major medical problems (e.g., heart disease, cancer); (6) current substance dependence (other than nicotine); and (7) self-reported pregnancy. Exclusionary criteria help ensure the safety of participants during the biological challenge wherein fear reactivity to bodily sensations was tested and rule out alternative explanations related to any observed effects (e.g., effects being due to psychopathology rather than the studied variables; Forsyth & Zvolensky, 2002). Individuals with current nicotine dependence were not excluded from the current study, given that one of the larger investigations providing data for these analyses explicitly focused on relations between smoking and panic responsivity.