"But it might be a heart attack": Intolerance of uncertainty and panic disorder symptoms

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A B S T R A C T

Panic disorder models describe interactions between feared anxiety-related physical sensations (i.e., anxiety sensitivity; AS) and catastrophic interpretations therein. Intolerance of uncertainty (IU) has been implicated as necessary for catastrophic interpretations in community samples. The current study examined relationships between IU, AS, and panic disorder symptoms in a clinical sample. Participants had a principal diagnosis of panic disorder, with or without agoraphobia ($n = 132$; 66% women). IU was expected to account for significant variance in panic symptoms controlling for AS. AS was expected to mediate the relationship between IU and panic symptoms, whereas IU was expected to moderate the relationship between AS and panic symptoms. Hierarchical linear regressions indicated that IU accounted for significant unique variance in panic symptoms relative to AS, with comparable part correlations. Mediation and moderation models were also tested and suggested direct and indirect effects of IU on panic symptoms through AS; however, an interaction effect was not supported. The current cross-sectional evidence supports a role for IU in panic symptoms, independent of AS.

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1. Introduction

Contemporary models of panic disorder implicate generalized biological vulnerabilities, psychological vulnerabilities, and a perceived lower level of control in the development of panic attacks (Clark, 1986; Meuret et al., 2006; Suárez, Bennett, Goldstein, & Barlow, 2009). Specifically, situational (e.g., state anxiety) and subjective (e.g., interpretation of bodily sensations) factors interact with predispositional fears of bodily sensations and sensitivities to somatic changes, facilitating catastrophic misinterpretations of symptoms. The catastrophic misinterpretations culminate in physical, emotional, and behavioral responses, which further increase during stress, resulting in a self-perpetuating cycle of recurrent and seemingly uncued panic attacks.

Panic disorder models implicitly involve anxiety sensitivity (AS) – the fear of sensations related to anxiety resulting from expectations of catastrophic consequences (Reiss & McNally, 1985). AS is typically described as having three dimensions, a fear of somatic sensations (i.e., somatic), a fear of cognitive dyscontrol (i.e., cognitive), and a fear of socially observable anxiety reactions (i.e., social). AS increases the probability sensations will be misinterpreted as threatening, facilitating vulnerability to subsequent panic attacks and panic disorder (McNally, 2002). People with panic disorder report elevated levels of AS (Taylor, Koch, & McNally, 1992) and prospective studies indicate elevations in AS predict panic disorder symptoms (Maller & Reiss, 1992; Schmidt, Lerew, & Jackson, 1997); similarly, reductions in AS have been associated with reductions in panic disorder symptoms (Smits, Powers, Cho, & Telch, 2004). There are questions about the specificity of the relationship between AS and panic (Naragon-Gainey, 2010), but AS has received considerable attention in panic disorder research (Barlow, 2002; Barlow, Allen, & Choate, 2004; Manfro, Heldt, Cordioli, & Otto, 2008; Reiss & McNally, 1985; Sexton, Norton, Walker, & Norton, 2003; Starcevic & Berle, 2006). The relationship between AS and catastrophic misinterpretations

of bodily sensations may be further explained, in part, by the inherent uncertainty and uncontrollably associated with such sensations (Boelen & Carleton, 2012; Carleton, Sharpe, & Asmundson, 2007b; Carleton, Fetzner, Hackl, & McEvoy, 2013; Rosen et al., 2010).

Difficulties tolerating uncertainty, or intolerance of uncertainty (IU), represent a dispositional characteristic resulting from negative beliefs about uncertainty and its implications (Dugas & Robichaud, 2007) wherein the possibility of a negative event occurring is considered threatening irrespective of the probability of its occurrence (Carleton et al., 2007b). The IU construct includes prospective (i.e., cognitive perceptions of threat pertaining to future uncertainty) and inhibitory (i.e., behavioral symptoms indicating apprehension due to uncertainty) dimensions (Birrell, Meares, Wilkinson, & Freeston, 2011; Carleton, Norton, & Asmundson, 2007a; McEvoy & Mahoney, 2011). Substantial evidence has related IU to generalized anxiety disorder (Buhr & Dugas, 2006; Dugas, Marchand, & Ladouceur, 2005a; Koerner & Dugas, 2008); however, more recent research indicates IU may be important for the development and maintenance of all anxiety disorders (Boswell, Thompson-Hollands, Farchione, & Barlow, 2013; Carleton, 2012; Carleton et al., 2012a; Mahoney & McEvoy, 2012a, 2012c; McEvoy & Mahoney, 2012). Specific relationships have been identified between IU and generalized anxiety disorder (Dugas, Buhr, & Ladouceur, 2004a; Dugas, Schwartz, & Francis, 2004b; Dugas et al., 2005a, 2005b), obsessive compulsive disorder (Holaway, Heimberg, & Coles, 2006; Tolin, Abramowitz, Brigidi, & Foa, 2003), and social anxiety disorder (Boelen & Reijntjes, 2009; Boelen, Vrinssen, & van Tulder, 2010; Carleton, Collimore, & Asmundson, 2010), with evidence of a generalized neurobiological relationship between IU and anxiety (Grupe & Nitschke, 2013). Preliminary evidence from a community sample has supported a specific, unique relationship between IU and panic disorder symptoms (Carleton et al., 2013) and there is recent evidence that reductions in IU are predictive of reductions in anxiety (Boswell et al., 2013).

There are at least two avenues by which IU may facilitate panic disorder symptoms (Carleton, 2012). The first avenue is through the interpretation of physical sensations. For example, heart palpitations are not inherently threatening and may actually be sought out (e.g., during amusement park rides or as indications of romantic interest); however, if the cause and meaning of the palpitations are uncertain, the capacity to tolerate that uncertainty without catastrophizing becomes important. The second avenue results from inherently uncertain elements of uncued panic attacks (e.g., recurrent unexpected panic attacks; where and when the attack might occur, how long it would last) serving as hallmarks for panic disorder (American Psychiatric Association, 2000, 2013). Nevertheless, research exploring the relationship between IU and panic disorder remains relatively limited, with IU levels reported by patients diagnosed with panic disorder (with or without agoraphobia) comparable to patients with other anxiety disorders and significantly higher than undergraduate and community samples (Carleton et al., 2012a; McEvoy & Mahoney, 2011, 2012; Mahoney & McEvoy, 2012c).

Only six studies (Carleton et al., 2013; Dugas, Gosselin, & Landouceur, 2001; Dugas et al., 2005a; McEvoy & Mahoney, 2012; Norton, Sexton, Walker, & Norton, 2005; Norton, Sexton, Walker, & Norton, 2003) have explored the specific relationship between IU and panic disorder symptoms. In two of the studies no significant relationship was found in an undergraduate sample (Sexton et al., 2003) or a clinical sample (Norton et al., 2005); however, panic disorder symptoms were assessed indirectly (i.e., Beck Anxiety Inventory; Beck, Steer, Ball, & Ranieri, 1996) and IU was assessed with the original 27-item Intolerance of Uncertainty Scale (IUS-27; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994), which may

be worry-specific (Gentes & Ruscio, 2011). A third study (Dugas et al., 2005a) found that individuals with a panic disorder diagnosis reported less IU than individuals with a GAD diagnosis; that said, individuals with panic disorder still demonstrated higher levels of IU than non-clinical individuals. Furthermore, IU was assessed with the IUS-27, which was significantly related to worry but not fear of bodily sensations, agoraphobic cognitions, or behavioural avoidance. In contrast, Dugas et al. (2001) reported a modest correlation between IU and AS among undergraduates. Similarly, McEvoy and Mahoney (2012) found evidence that the inhibitory dimension of IU partially mediated the relationship between neuroticism and panic disorder symptoms in a sample of anxiety disorder patients. The same team suggested an important relationship between IU, AS, and panic symptoms, but did not investigate AS (Mahoney & McEvoy, 2012b; McEvoy & Mahoney, 2012). Relatedly, a significant and substantial relationship was found between AS, the inhibitory dimension of IU, and panic disorder symptoms in a community sample (Carleton et al., 2013); specifically, the inhibitory dimension of IU accounted for relatively more variance in avoidance symptoms related to panic disorder than the somatic dimension of AS.

The current study was designed to extend previous findings and examine the proportion of unique and shared variance in panic disorder symptoms accounted for by dimensions of IU (i.e., inhibitory IU; prospective IU) when controlling for dimensions of AS in a clinical sample of people diagnosed with panic disorder. Based on the preliminary evidence (Boswell et al., 2013; Carleton et al., 2013; McEvoy & Mahoney, 2012), 1) inhibitory IU, rather than prospective IU, was expected to account for significant variance in panic disorder symptoms, even when controlling for AS dimensions; and 2) the somatic and cognitive dimensions of AS, rather than the social dimension, were also expected to account for significant variance in panic symptoms, even when controlling for IU dimensions.

Based on existing proposals that IU may be a required component of AS (Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, in press; Carleton, 2012; Carleton et al., 2007b), mediation and moderation models were also tested. The somatic and cognitive dimensions of AS were assessed for mediation of the relationship between inhibitory IU and panic disorder symptoms. Alternatively, based on the possibility that IU may moderate the relationship between AS dimensions and panic symptoms, the interaction of the inhibitory dimension of IU with the somatic and cognitive dimensions of AS was expected to account for additional variance in panic disorder symptoms beyond the direct relationships with IU and AS.

2. Materials and methods

2.1. Participants

Data were included from 132 participants (45 men [M_{age} = 37.36; SD = 11.13] and 87 women [M_{age} = 36.83; SD = 11.16]) who attended the Anxiety Treatment and Research Centre, which is an established outpatient anxiety treatment and research center. The authors complied with American Psychological Association ethical standards in the treatment of participants and the data used were from a research database approved by the institutional Research Ethics Board. All participants gave informed consent to have their data entered into the database for future research. The self-report measures were completed, in paper-and-pencil format, prior to the diagnostic interviews. Diagnostic criteria were based on the Diagnostic and Statistical Manual of Mental Disorders (4th ed., text revision; DSM-IV-TR; American Psychiatric Association, 2000), and diagnoses were assigned using the Structured Clinical Interview for DSM-IV (First, Gibbon, Spitzer, & Williams, 2002). Participants received a principal axis I diagnosis based upon the disorder that was found to be most disabling at the time of the assessment, which