



The effects of an anxiety sensitivity intervention on anxiety, depression, and worry: Mediation through affect tolerances



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ABSTRACT

Recently there has been increased interest in emotional and physical tolerance risk factors for mood and anxiety disorders. Three tolerance risk factors that have been shown to be related are anxiety sensitivity (AS), distress tolerance (DT), and discomfort intolerance (DI). Although previous research has demonstrated these constructs are malleable, no research has investigated the effects of an AS intervention on DT or DI. Further, no studies have investigated whether changes in DT or DI play a role in mood and anxiety symptom amelioration due to an AS intervention. Participants ($N = 104$), who were selected for elevated levels of AS, completed a single-session computer-assisted AS intervention or a control intervention and follow-up assessments at 1-week and 1-month post intervention. Results revealed that the intervention reduced AS and increased DT, but did not affect DI at the 1-week follow-up. Mediation analyses revealed that changes in AS and DT both mediated changes in symptoms (depression, anxiety, worry) due to the intervention at 1-month follow-up, however, when AS and DT were considered in the same model only the effect via AS remained significant. These results have important implications for the nature of the relationships between AS, DT, and DI as well as the specific mechanistic pathways through which an AS intervention ameliorates symptoms.

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Introduction

Anxiety and depressive disorders are prevalent and disabling conditions that commonly co-occur (Kessler et al., 2003). Given the implications for etiological models, prevention, and treatment, there has been a great deal of research on the identification of common and distinct risk factors for anxiety and depressive disorders (Beekman et al., 2000; Beesdo, Pine, Lieb, & Wittchen, 2010; de Graaf, Bijl, Smit, Vollebergh, & Spijker, 2002; Kendler, Gardner, Gatz, & Pedersen, 2007; Moffitt et al., 2010). Although a number of studies have identified negative emotionality as a robust risk factor for the development of these conditions (Beesdo et al., 2010; Kendler, Kuhn, & Prescott, 2004; Moffitt et al., 2010), recent research has begun to investigate constructs reflective of individual

differences in the ability to *tolerate* negative emotional states rather than variables reflective of the frequency/intensity of the negative emotional states themselves (see Leyro, Zvolensky, & Bernstein, 2010 for a review).

Although a number of affect tolerance constructs have been discussed in the literature, anxiety sensitivity (AS), distress tolerance (DT), and, to a lesser extent, discomfort intolerance (DI) have received considerable research attention within the context of anxiety and depression. AS, or the fear of anxiety-related sensations, has been associated with greater anxiety and worry symptoms (Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010; Macatee, Capron, Guthrie, Schmidt, & Cogle, 2013; Norr et al., 2013; Viana & Rabian, 2008) as well as depressive symptoms (Cox, Enns, Freeman, & Walker, 2001; Cox, Taylor, & Enns, 1999; Tull & Gratz, 2008). Further, elevated AS confers risk for the development of depressive symptoms (Grant, Beck, & Davila, 2007) and anxiety disorders (Schmidt, Zvolensky, & Maner, 2006). DT is defined as an individual difference variable reflecting the capacity to tolerate aversive emotional states (Simons & Gaher, 2005). Low DT has also been associated with greater anxiety and worry

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symptoms (Huang, Szabó, & Han, 2009; Keough et al., 2010; Starr & Davila, 2012; Timpano, Buckner, Richey, Murphy, & Schmidt, 2009) and depressive symptoms in non-clinical samples (Anestis, Gratz, Bagge, & Tull, 2012; Buckner, Keough, & Schmidt, 2007; Dennhardt & Murphy, 2011; Ellis, Fischer, & Beevers, 2010; Gorka, Ali, & Daughters, 2012). In addition, low DT has been shown to prospectively predict increases in worry symptoms (Macatee et al., 2013) and has been associated with greater anxiety and depressive symptoms at post-treatment (McHugh et al., 2014; Williams, Thompson, & Andrews, 2013). DI, a construct reflective of individual differences in difficulties tolerating uncomfortable physical sensations, has been linked to anxiety and depressive symptoms, though its relationship to depressive symptoms appears to be less robust given that high DI has only been shown to predict changes in anxiety, but not depressive, symptoms over time (Schmidt, Richey, & Fitzpatrick, 2006). Research on DI has revealed high DI to be most strongly associated with panic-relevant symptoms and outcomes (e.g., fear reactivity to a CO₂ challenge; Bonn-Miller, Zvolensky, & Bernstein, 2009; Schmidt, Richey, Cromer, & Buckner, 2007; Schmidt, Richey, et al., 2006). To summarize, extant data suggests that AS, DT, and DI are associated with anxiety and depressive pathology, though the relationships amongst the affect tolerance constructs themselves, and their relative importance to anxiety and depressive symptoms, has remained relatively unexplored.

AS, DT, and DI have been conceptualized as theoretically-related, but distinct, constructs (Leyro et al., 2010; Zvolensky, Vujanovic, Bernstein, & Leyro, 2010), though little empirical work has been conducted to explicitly test the proposed theoretical associations between these constructs. Bernstein, Zvolensky, Vujanovic, and Moos (2009) conducted an exploratory factor analysis in a healthy sample and found AS and DT to be related to one another as distinct lower-order factors of a higher-order affect tolerance factor, whereas DI was unrelated to AS and DT at the lower and higher-order levels. Mitchell, Riccardi, Keough, Timpano, and Schmidt (2013) found a similar latent structure amongst these variables in non-clinical and clinical samples, though they found AS to be a lower-order factor of DT rather than a distinct but hierarchically adjacent lower-order factor. Though the results of these studies differ on the nature of the relationship between AS and DT, they converge on the dissociation between emotional tolerance (i.e., AS and DT) and physical tolerance (i.e., DI).

The differential importance of these tolerance variables to anxiety and depressive symptoms has rarely been examined in the literature. Available data suggest that AS and DT may contribute both independently and synergistically to worry symptoms (Allan, Macatee, Norr, & Schmidt, 2014; Keough et al., 2010; Norr et al., 2013) whereas for depressive symptoms evidence is less consistent for the non-redundant role of DT (Capron, Norr, Macatee, & Schmidt, 2013; Starr & Davila, 2012). There are no studies known to the authors that examine the unique contribution of DI to the prediction of anxiety or depressive symptoms. Taken together, existing data suggest that both AS and DT are uniquely associated with worry symptoms, whereas for depressive symptoms AS appears to play a more important role. Further, little is known about the unique role of DI in anxiety or depressive symptoms, extant research suggesting that it tends to be more narrowly related to panic-relevant variables (Bonn-Miller et al., 2009; Schmidt, Richey, et al., 2007).

In a recent paper aimed at developing a translational research framework, Zvolensky, Schmidt, Bernstein, and Keough (2006) stressed the importance of examining prevention and intervention protocols to determine the malleability of risk factors for mood and anxiety symptoms. A growing number of studies have effectively developed AS intervention protocols, including single day workshops (Gardenswartz & Craske, 2001), three-session CBT interventions (Watt, Stewart, Birch, & Bernier, 2006; Watt, Stewart,

Lefavre, & Uman, et al., 2006), six-week exercise protocols (Broman-Fulks & Storey, 2008), and psychoeducation programs (Feldner, Zvolensky, Babson, Leen-Feldner, & Schmidt, 2008). Schmidt, Eggleston, et al. (2007) examined the effects of a brief (one-session) AS intervention including elements of psychoeducation and interoceptive exposure in a sample of 404 young adults (M age = 19.3, SD = 3.9). They found significant mean reductions in post-intervention AS. Keough and Schmidt (2012) replicated the findings of Schmidt, Eggleston, et al. (2007), finding post-intervention AS reductions. They also found that reductions in AS were maintained at follow-up one month later.

Although few interventions have been designed to explicitly target DT, several studies have examined the impact of exposure, cognitive-behavioral, acceptance, and mindfulness based intervention protocols on DT. In general, these interventions have led to significant increases in DT (e.g., Bornoalova, Gratz, Daughters, Hunt, & Lejuez, 2012; McHugh et al., 2014; Williams et al., 2013; but see Kapson, Leddy, & Haaga, 2012 for an exception). In the largest such study, McHugh et al. (2014) examined the effects of cognitive-behavioral therapy (CBT) on a self-report measure of DT composed of items derived via factor analyses from several affect tolerance measures in a sample of 469 participants (M age = 34 years, SD = 14) in a partial hospital setting (i.e., treatment in a managed care facility lasting on average 8.2 days, SD = 3.2). They found significant changes in DT as well as associations between changes in DT and reductions in mood and anxiety symptoms. Of note, several aspects of their treatment overlapped with aspects of AS interventions (i.e., psychoeducation, challenging negative automatic thoughts).

In contrast to the recent focus of intervention effects on DT, relatively few studies have examined intervention effects on DI. To our knowledge, only a single study examined whether it was possible to reduce levels of DI using a mindfulness-based intervention. Lotan, Tanay, and Bernstein (2013) examined the effect of 4 weekly 60-minute mindfulness training sessions compared to a no-treatment control condition in a community sample of 53 adults (M age = 25.2, SD = 4.3). Whereas reductions in DT were found, there was no improvement in DI, leading Lotan et al. to speculate that the orthogonal nature of DT and DI and/or the lack of malleability of DI may have accounted for this. Together, these findings suggest that similar intervention protocols may be useful in reducing both AS and DT, but not DI.

Interventions focused on transdiagnostic risk factors offer an efficient means to potentially impact multiple disorders. To our knowledge, only three studies have considered whether reductions in risk factors such as AS, DT, and DI mediate the relation between risk factor interventions and reductions in mood and anxiety. Smits, Powers, Cho, and Telch (2004) found that AS mediated the relationship between CBT and reductions in panic symptoms in a sample of 103 individuals diagnosed with panic disorder. Schmidt, Capron, Raines, and Allan (in press) examined the effects of a computerized intervention targeting a lower-order dimension of AS (i.e., AS cognitive concerns) in a sample of 108 community participants and whether this intervention influenced worry and depressive symptoms as well as suicidality and suicidal ideation. They found that the targeted dimension of AS (i.e., AS cognitive concerns) at month 1 mediated the effects of the intervention on month 1 worry, depression, suicidality, and suicidal ideation. Finally, Olthuis, Watt, Mackinnon, and Stewart (in press) found that reductions in AS mediated the effects of a telephone-delivered CBT intervention. Although other studies have also found that interventions targeting AS and DT lead to reductions in psychopathology (e.g., Mitchell, Capron, Raines, & Schmidt, 2014; Schmidt, Eggleston, et al., 2007; Williams et al., 2013), no other studies have examined whether the effects of these interventions on

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