Journal of Cognitive Psychotherapy: An International Quarterly
Volume 29, Number 1 • 2015

Examining the Specific Facets of Distress Tolerance That Are Relevant to Health Anxiety

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Researchers have called for examinations of associations between distinct facets of distress tolerance and specific forms of psychopathology. We examined associations between five facets of distress tolerance (intolerance of uncertainty, ambiguity, frustration, negative emotion, and physical discomfort) and health anxiety using a large community sample of adults. Structural equation modeling was used to examine associations. Intolerance of uncertainty, negative emotion, and physical discomfort were the only facets of distress tolerance that shared unique associations with health anxiety after accounting for the overlap among the facets of distress tolerance. Intolerance of physical discomfort shared an especially strong unique association with health anxiety. These results highlight facets of distress tolerance that are particularly relevant to health anxiety. Conceptual and therapeutic implications are discussed.

Keywords: distress tolerance; health anxiety; intolerance of uncertainty; intolerance of negative emotion; intolerance of physical discomfort

Distress tolerance is a construct that purportedly underlies multiple forms of psychopathology and has been defined as "the perceived capacity to withstand negative emotional and/or other aversive states" (Zvolensky, Vujanovic, Bernstein, & Leyro, 2010, p. 406). To better understand the potential transdiagnostic importance of distress tolerance, Zvolensky et al. (2010) called for examinations of (a) the associations between distress tolerance and forms of psychopathology and (b) whether specific facets of distress tolerance share stronger associations with certain forms of psychopathology than do other facets of distress tolerance. According to Zvolensky et al., studies examining these two issues could ultimately lead to the use of specialized psychological interventions that target the facet(s) of distress intolerance of particular importance to a given form of psychopathology.

Heeding Zvolensky et al.'s (2010) call for targeted examinations of relations between distress tolerance and psychopathology, we examined the strength of associations between facets of distress

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http://dx.doi.org/10.1891/0889-8391.29.1.32

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tolerance and health anxiety in this study. Health anxiety consists of four interrelated factors, including affective (anxiety about health), cognitive (dysfunctional beliefs about health), perceptual (hypervigilance to physical sensations), and behavioral (avoidance behavior, typically reassurance seeking) factors, within cognitive-behavioral models (Longley, Watson, & Noyes, 2005). Mild health anxiety is considered a ubiquitous phenomenon (Salkovskis & Warwick, 2001). However, severe health anxiety is a symptom of multiple *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) psychological disorders, including somatic symptom disorder and illness anxiety disorder (American Psychiatric Association, 2013a, 2013b). Severe health anxiety is related to several negative outcomes, such as lowered household income, interpersonal difficulties, emotional distress, and the overuse of medical services (Noyes, Carney, Hillis, Jones, & Langbehn, 2005). Thus, identifying possible risk factors for health anxiety is important to improve outcomes for individuals suffering from health anxiety (Asmundson, Abramowitz, Richter, & Whedon, 2010).

The reduced capacity to withstand body sensations has been long thought of as a core predisposing factor for health anxiety, with Barsky, Wyshak, and Klerman (1990) labeling this phenomenon as *somatosensory amplification*. Somatosensory amplification refers to the tendency to experience body/physical sensations as particularly bothersome. Somatosensory amplification significantly correlates with health anxiety, and the correlation is not accounted for by related variables (e.g., anxiety sensitivity; Fergus & Valentiner, 2010). In addition, somatosensory amplification interacts with daily stressors to prospectively predict greater body sensations and medical use (Barsky, Ahern, Bailey, & Delamater, 1996). Given its purported role within the pathogenesis of health anxiety, somatosensory amplification is an important target of intervention within some health anxiety treatments (Barsky & Ahern, 2004).

Pursuant to this study, somatosensory amplification appears to be a marker of distress tolerance. In reviewing the available literature and existing measures purported to tap distress tolerance, Zvolensky et al. (2010) proposed that five specific constructs represent unique facets of a higher order distress (in)tolerance construct. One of these constructs was labeled *intolerance of physical discomfort*. Intolerance of physical discomfort reflects the reduced capacity to withstand uncomfortable physical sensations (Schmidt, Richey, & Fitzpatrick, 2006). Zvolensky et al.'s conceptualization of distress tolerance is relatively new, and the only known published study to examine this conceptualization was completed by Bardeen, Fergus, and Orcutt (2013). Bardeen et al. found that somatosensory amplification was a salient indicator of an intolerance of a physical discomfort construct. The remaining lower order distress tolerance constructs outlined by Zvolensky et al. were intolerance of uncertainty, ambiguity, frustration, and negative emotion. Consistent with Zvolensky et al.'s conceptualization, Bardeen et al. found that intolerance of uncertainty, ambiguity, frustration, negative emotion, and physical discomfort were structurally distinguishable, albeit related, constructs that loaded on a higher order distress tolerance construct. Bardeen et al.'s study provides the only known published structural model that consists of multiple scales that serve as indicators for each of the five facets of distress tolerance within Zvolensky et al.'s conceptualization. For this reason, Bardeen et al.'s structural model was retained to examine associations between distress tolerance and health anxiety in this study.

The operational definitions of intolerance of uncertainty, ambiguity, frustration, and negative emotion are briefly reviewed in the following section. Readers interested in a fuller description of these facets of distress tolerance are referred to Leyro, Zvolensky, and Bernstein (2010). Leyro et al. asserted that the these facets of distress tolerance are distinct from theoretically related variables, such as anxiety sensitivity and emotion regulation, but the degree to which distress tolerance, as conceptualized by Zvolensky et al. (2010), is distinct from related variables has yet to be empirically tested. Thus, our focus in this study was solely on examining relations between Zvolensky et al.'s five lower order facets of distress tolerance and health anxiety. Following from Bardeen et al.'s (2013) findings, somatosensory amplification can be viewed as a marker of

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intolerance of physical discomfort. The robust association between somatosensory amplification and health anxiety found in prior studies therefore suggests that the intolerance of physical discomfort facet of distress tolerance is of importance to health anxiety. What remains less clear from the available literature is the importance of the other facets of distress tolerance, as conceptualized by Zvolensky et al., to health anxiety.

Among the other facets of distress tolerance within Zvolensky et al.'s (2010) conceptualization, intolerance of uncertainty has received the greatest empirical attention in relation to health anxiety. Intolerance of uncertainty refers to the dispositional fear of the unknown (Carleton, 2012). Because the origins and consequences of body sensations are typically unknown, individuals who are intolerant of uncertainty are likely to catastrophize about body sensations and experience increased anxiety (Carleton, Sharpe, & Asmundson, 2007). Research supports a robust association between intolerance of uncertainty and health anxiety (Deacon & Abramowitz, 2008; Fergus & Bardeen, 2013; Fetzner et al., 2014). Although some researchers suggest that intolerance of uncertainty and intolerance of physical discomfort (i.e., somatosensory amplification) should be distinct targets of intervention within psychological treatments for health anxiety (Langlois & Ladouceur, 2004), it is possible that the impact of intolerance of physical discomfort on health anxiety may, in part, depend on intolerance of uncertainty. For example, Carleton, Sharpe, et al. (2007) speculated that intolerance of uncertainty may ameliorate the catastrophic thinking surrounding the unknown origins and consequences of body sensations. As such, individuals may have a greater capacity to withstand body sensations as they become increasingly tolerant of uncertainty.

Although the aforementioned findings link two specific facets of distress tolerance within Zvolensky et al.'s (2010) conceptualization to health anxiety, no known published study has yet directly examined associations between the three other facets of distress tolerance (intolerance of ambiguity, frustration, and negative emotion) and health anxiety. Deacon and Abramowitz (2008) speculated that difficulties tolerating ambiguity may contribute to health anxiety. The operational definitions of intolerance of uncertainty and ambiguity are similar and often used interchangeably (Grenier, Barrette, & Ladouceur, 2005). However, Grenier et al. (2005) asserted that these two facets of distress tolerance are distinguishable based on time orientation, with uncertainty pertaining to the future and ambiguity pertaining to the present moment. Health anxiety is marked by difficulties tolerating experiences in the here and now (e.g., body sensations) as well as difficulties tolerating possible future threat(s) associated with those present moment experiences (e.g., the feared medical condition that the feared body sensations could be symptomatic of). Thus, tolerance of ambiguity might be an additional facet of distress tolerance that contributes to health anxiety.

Indirect evidence highlights the possibility that intolerance of negative emotion and frustration may also contribute to health anxiety. For example, health anxiety is associated with emotion dysregulation (Bardeen & Fergus, 2014; Fergus & Valentiner, 2010). Tolerance for negative emotion is considered related to, yet distinct from, emotion regulation, with Brandt, Zvolensky, and Bonn-Miller (2013) noting that ability to tolerate negative emotions is different from the processes that lead to the alteration of affective states. Nonetheless, Brandt et al.'s data suggest that individuals who have difficulties tolerating negative emotions are more likely to experience emotion dysregulation. Macatee and Cougle (2013) provided evidence that intolerance of frustration may relate to health anxiety, finding that health anxiety was associated with post–task anxiety after the completion of a frustrating task (i.e., mirror tracing) even after controlling for pre–task anxiety. Macatee and Cougle speculated that the tendency to fear body sensations may increase anxiety in response to frustrating tasks.

Because of the limited scope of extant studies examining distress tolerance and health anxiety, we currently do not fully understand which facets of distress tolerance are relevant to health anxiety. Extant studies have only directly examined relations between two, of five, distress tolerance constructs with Zvolensky et al.'s (2010) conceptualization and health anxiety. It is possible that

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the association between each facet of distress tolerance and health anxiety is explained by variance shared with the other facets of distress tolerance. Indeed, we currently do not know whether each facet of distress tolerance accounts for unique variance in health anxiety scores beyond that accounted for by the remaining four facets of distress tolerance. Those facets of distress tolerance that share unique associations with health anxiety could be particularly important in understanding the pathogenesis of health anxiety as well as in developing treatments to address health anxiety.

We examined associations between five facets of distress tolerance and health anxiety in this study. Structural equation modeling (SEM) was used to examine these associations because SEM allows for an examination of latent interrelations, which take measurement error into account (e.g., scale unreliability; Brown, 2006). The research findings reviewed earlier led us to predict that each targeted facet of distress tolerance would share a significant association with health anxiety. SEM was also used to examine associations between each facet of distress tolerance and health anxiety while controlling for the overlap among the other four facets of distress tolerance. Because this study is the first known examination of the unique associations between the five facets of distress tolerance and psychopathology, these analyses were exploratory. Conceptually, and as reviewed earlier, the link between nearly all of the facets of distress tolerance and health anxiety appears closely tied to difficulties tolerating body sensations. It is thus possible that the intolerance of physical discomfort facet of distress tolerance may share the largest unique association with health anxiety.

Although it remains important to examine health anxiety among clinical respondents, we used a large community sample. This methodology was informed by data suggesting that health anxiety is best viewed as falling along a continuum (Ferguson, 2009; Longley et al., 2010). The continuous nature of health anxiety is particularly important when considering study design because it suggests that the full range of available health anxiety scores should be used to minimize information loss and maximize statistical power. In addition, SEM analyses require large samples (Kline, 2011). The use of a large community sample in this study ensured that sample size requirements for SEM analyses were met.

Method

Participants

The sample consisted of 830 adults located in the United States. The mean age of the sample was 34.1 years ($SD = 12.5$; ranging from 18 to 80), and respondents predominantly self-identified as female (60.5%). In terms of racial identification, 81.2% of the sample self-identified as White, 6.7% as Black, 6.4% as Asian, 1.0% as American Indian or Alaska Native, 2.9% as Other, and 1.8% preferred not to respond. In terms of ethnic identification, 6.9% of the sample self-identified as Hispanic or Latino. In terms of educational background, a slight majority of the sample reported receiving a 2-year college degree or higher (53.3%). The majority of the sample reported being currently employed at least part-time (67.2%). Participant recruitment was part of a broader study on distress tolerance and data from study participants unrelated to health anxiety are presented in Bardeen et al. (2013).

Measures

Intolerance of Uncertainty. Intolerance of uncertainty has been broadly defined as a dispositional fear of the unknown (Carleton, 2012). Following Bardeen et al. (2013), three indicators of intolerance of uncertainty were used in this study. Two of the indicators were the Prospective Uncertainty (e.g., *Unforeseen events upset me greatly*) and the Inhibitory Uncertainty (e.g., *When I am uncertain, I can't function very well*) scales of the Intolerance of Uncertainty Scale 12-item version (IUS-12; Carleton, Norton, & Asmundson, 2007). Carleton, Norton, et al. (2007) found that these two scales

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of the IUS-12 are factorially distinct. The third indicator of intolerance of uncertainty was Part A of the Intolerance of Uncertainty Index (IUI-A; Gosselin et al., 2008). The IUI-A is a 15-item measure that assesses difficulties tolerating or accepting uncertainty (e.g., *I have difficulty tolerating life's uncertainties*). The IUI-A is a unifactorial scale (Carleton, Gosselin, & Asmundson, 2010). These three scales have been found to significantly load on the same higher order intolerance of uncertainty factor (Fergus, 2013). All three indicators of the intolerance of uncertainty construct demonstrated adequate internal consistency in this study (IUS-12-Prospective: $M = 20.41$, $SD = 6.73$, $\alpha = .88$; IUS-12-Inhibitory: $M = 11.18$, $SD = 5.35$, $\alpha = .91$; IUI-A: $M = 40.37$, $SD = 15.82$, $\alpha = .96$). Higher scores on these scales indicate greater intolerance of uncertainty.

Intolerance of Ambiguity. Intolerance of ambiguity has been defined as difficulties tolerating complicated, novel, or vague situations and/or stimuli (Zvolensky et al., 2010). Following Bardeen et al. (2013), two indicators of intolerance of ambiguity were used in this study. One indicator was the Multiple Stimulus Types Ambiguity Tolerance-I (MSTAT-I; McLain, 1993). The MSTAT-I is a 22-item measure that assesses intolerance of ambiguity (e.g., *I try to avoid problems which don't seem to have only one best solution*). The second indicator was the Tolerance of Ambiguity Scale-12 (TAS-12; Herman, Stevens, Bird, Mendenhall, & Oddou, 2010). The TAS-12 is a 12-item revised version of Budner's (1962) 16-item TAS and also assesses intolerance of ambiguity (e.g., *A good job is one where what is to be done and how it is to be done are always clear*). These two scales have been found to significantly load on the same higher order intolerance of ambiguity factor (Bardeen et al., 2013). Both indicators of the intolerance of ambiguity construct (MSTAT-I: $M = 81.85$, $SD = 21.04$, $\alpha = .91$; TAS-12: $M = 34.61$, $SD = 7.25$, $\alpha = .76$) demonstrated adequate internal consistency in this study. Higher scores on these scales indicate greater intolerance of ambiguity.

Intolerance of Frustration. Intolerance of frustration has been defined as the ability to withstand aggravation (Zvolensky et al., 2010). Following from Bardeen et al. (2013), Harrington's (2005) 28-item Frustration Discomfort Scale (FDS) was used to assess intolerance of frustration. The FDS assesses one's perceived capacity to withstand aggravation across four domains, including (a) entitlement (e.g., *I can't stand it if other people act against my wishes*), (b) discomfort intolerance (e.g., *I can't stand having to push myself at tasks*), (c) achievement (e.g., *I can't stand feeling that I'm not on top of my work*), and (d) emotional intolerance (e.g., *I can't bear disturbing feelings*). Bardeen et al. did not include the emotional intolerance scale of the FDS in their structural model because of conceptual overlap with the intolerance of negative emotion construct. The emotional intolerance scale was included in this study to ensure that the intolerance of frustration construct was assessed as conceptualized by Harrington. Harrington found that the four FDS scales are factorially distinct. The four indicators of intolerance of frustration demonstrated adequate internal consistency in this study (FDS-Entitlement: $M = 19.90$, $SD = 6.49$, $\alpha = .87$; FDS-Discomfort Intolerance: $M = 17.83$, $SD = 6.42$, $\alpha = .89$; FDS-Achievement: $M = 20.92$, $SD = 6.25$, $\alpha = .85$; FDS-Emotional Intolerance: $M = 18.70$, $SD = 7.13$, $\alpha = .90$). Higher scores on the FDS scales indicate greater intolerance of frustration.

Intolerance of Negative Emotion. Intolerance of negative emotion has been defined as the inability to withstand distress associated with negative emotional states (Simons & Gaher, 2005). Following Bardeen et al. (2013), the four scales of Simons and Gaher's (2005) 15-item Distress Tolerance Scale (DTS) served as indicators of the intolerance of negative emotion construct. The four scales of the DTS include (a) tolerance (i.e., the ability to tolerate negative emotions; e.g., *Feeling distressed or upset is unbearable to me*), (b) appraisal (i.e., perception of negative emotions as distressing; e.g., *I am ashamed of myself when I feel distressed or upset*), (c) absorption (i.e., inability to concentrate on anything else when emotional distress is present; e.g., *My feelings of distress are so intense that they completely take over*), and (d) regulation (i.e., degree of effort to alleviate emotional distress; e.g., *I'll do anything to stop feeling distressed or upset*). Simons and Gaher found that the four scales of the DTS load on a higher order factor and this finding was replicated in Bardeen et al.'s study. All four indicators of the intolerance of negative emotion construct demonstrated adequate

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internal consistency in this study (DTS-Tolerance: $M = 2.76$, $SD = 1.14$, $\alpha = .82$; DTS-Appraisal: $M = 2.54$, $SD = 1.03$, $\alpha = .86$; DTS-Absorption: $M = 2.72$, $SD = 1.22$, $\alpha = .86$; DTS-Regulation: *Mean* = 2.89, $SD = 1.11$, $\alpha = .83$). DTS scale scores were calculated by summing the item responses and dividing by the total number of items. Lower scores on the DTS scales traditionally indicate greater intolerance of negative emotion. However, for ease of interpretation, we coded the DTS scales such that higher scores indicate greater intolerance of negative emotion in this study.

Intolerance of Physical Discomfort. Intolerance of physical discomfort refers to the intolerance of uncomfortable physical sensations (Schmidt et al., 2006). Following Bardeen et al. (2013), two indicators of intolerance of physical discomfort were used in this study. One indicator was the discomfort avoidance scale (e.g., *I take extreme measures to avoid feeling physically uncomfortable*) of the five-item Discomfort Intolerance Scale (DIS; Schmidt et al., 2006). The DIS consists of an additional scale, labeled *discomfort intolerance*, but Bardeen et al. found that the magnitude of the factor loading of this scale on a higher order intolerance of physical discomfort factor indicated unreliability, and this DIS scale should thus not be used as an indicator. As such, only the discomfort avoidance scale of the DIS was used in this study. The second indicator was the 10-item Somatosensory Amplification Scale (SSAS; Barsky et al. 1990). Items of the SSAS assess the tendency to experience physical sensations as particularly bothersome (e.g., *Even something minor, like an insect bite or splinter, really bothers me*). The discomfort avoidance scale of the DIS and the SSAS have been found to significantly load on the same higher order intolerance of physical discomfort factor (Bardeen et al., 2013). Both indicators of the intolerance of physical discomfort construct demonstrated adequate internal consistency in this study (DIS-Discomfort Avoidance: $M = 8.85$, $SD = 4.15$, $\alpha = .74$; SSAS: $M = 27.12$, $SD = 7.07$, $\alpha = .76$). Higher scores on these scales indicate greater intolerance of physical discomfort.

Health Anxiety. Heath anxiety was assessed using the 31-item Multidimensional Inventory of Hypochondriacal Traits (MIHT; Longley et al., 2005). The MIHT was specifically chosen as the measure of health anxiety in this study because it assesses for the four factors of health anxiety associated with contemporary cognitive-behavioral models. These four factors are represented by affective (e.g., *I worry a lot about my health*), cognitive (e.g., *Others do not seem sympathetic to my health problems*), perceptual (e.g., *I am usually aware of how I feel physically*), and behavioral (e.g., *I turn to others for support when I do not feel well*) scales. Each scale of the MIHT served as a separate indicator of the health anxiety in this study. The four MIHT scales have been found to significantly load on a higher order health anxiety factor (Stewart, Sherry, Watt, Grant, & Hadjistavropoulos, 2008). All four indicators of the health anxiety construct demonstrated adequate internal consistency in this study (MIHT-Affective: $M = 20.34$, $SD = 7.02$, $\alpha = .88$; MIHT-Cognitive: $M = 17.53$, $SD = 7.78$, $\alpha = .95$; MIHT-Perceptual: $M = 35.06$, $SD = 6.88$, $\alpha = .89$; MIHT-Behavioral: $M = 25.66$, $SD = 7.27$, $\alpha = .87$). Higher scores on the MIHT scales indicate greater health anxiety.

Procedure

Participants were recruited using Amazon's Mechanical Turk (MTurk), an Internet-based platform that allows individuals to request the completion of jobs (e.g., survey completion) for monetary compensation. Respondents completing surveys through MTurk have been found to produce high-quality data and are more demographically diverse than both standard Internet samples and American undergraduate samples (Buhrmester, Kwang, & Gosling, 2011; Paolacci & Chandler, 2014; Shapiro, Chandler, & Mueller, 2013). This research was approved by the local institutional review board. Recruitment was limited to MTurk workers older than 18 years of age and located in the United States. In addition, participation was restricted to MTurk workers with approval ratings higher than 95%, a method shown to increase data quality (Peer, Vosgerau, & Acquisti, 2014). Participants were required to provide electronic consent, and there was no penalty for withdrawing from the study. Upon completion of the study, participants were debriefed

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and paid in full. Compensation was $0.50, an amount consistent with the compensation given to MTurk workers completing prior studies of similar length (Buhrmester et al., 2011).

Data Analytic Strategy

We were interested in how the five distinguishable facets of distress tolerance within Zvolensky et al.'s (2010) conceptualization were associated with health anxiety. As such, we mirrored our structural model after the model evaluated by Bardeen et al. (2013) because that particular model is the only known empirically validated structural model that depicts Zvolensky et al.'s conceptualization of distress tolerance. We used a two-step modeling approach, in which a structural regression model was examined after fitting an adequate measurement model to the data (Kline, 2011). A measurement model was initially used to examine latent correlations between the facets of distress tolerance and health anxiety. In this measurement model, one of the indicators of each latent construct was fixed to 1.0 to set the metric of each latent construct (Brown, 2006; Kline, 2011). All of the latent factors were allowed to intercorrelate. Error variances of the indicators were *not* allowed to correlate because prior structural studies (reviewed earlier) found that the correlations among the indicators of each construct were accounted for by the respective latent construct.

A structural regression model was used next to examine unique associations between each facet of distress tolerance and health anxiety. In the structural regression model, the health anxiety construct served as the endogenous variable, and the five distress tolerance constructs served as the exogenous variables. As with the measurement model, one of the indicators of each latent construct was fixed to 1.0 to set the metric of each latent construct. Error variances of the indicators were again not allowed to correlate. The distress tolerance constructs were allowed to intercorrelate, and each distress tolerance construct was modeled as a predictor of the health anxiety construct. In the structural regression model, the correlation between each distress tolerance construct and health anxiety construct previously modeled in the measurement model was removed; however, a path coefficient between each distress tolerance construct and the health anxiety construct was added to the structural regression model.

Both models were tested by inputting a covariance matrix into LISREL 8.80 (Jöreskog & Sörbom, 2007) and using maximum likelihood estimation. Four commonly recommended (Brown, 2006; Hu & Bentler, 1999; Kline, 2011) fit statistics were used to evaluate the measurement model: comparative fit index (CFI), nonnormed fit index (NNFI), root mean square error of approximation (RMSEA), and standard root mean square residual (SRMR). Hu and Bentler's (1999) guidelines were used to evaluate fit: CFI and NNFI should be close to .95, RMSEA should be close to .06, and SRMR should be close to .08. Furthermore, the upper limit of the 90% RMSEA confidence interval should not exceed .10 (Kline, 2011).

It is important to note that this study represented a targeted examination of associations between distress tolerance and health anxiety rather than a further evaluation of Bardeen et al.'s (2013) structural model per se. As such, the fit statistics were evaluated to ensure adequacy of the tested models and, in turn, increased confidence in the parameter estimates of interest from the respective models (i.e., latent correlations, beta weights). Because this study did not represent a further evaluation of Bardeen et al.'s structural model, modification indices would only be considered should the tested model provide a poor fit to the data.

Results

Preliminary Analyses

We initially examined whether demographic variables were associated with health anxiety. If so, these variables may warrant inclusion in the structural models as covariates. Age did not

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significantly correlate with the MIHT total scale ($r = .01$, *ns*). In addition, there were no significant differences (magnitude of t values ranged from 0.41 to 0.91, *ns*) on the MIHT total scale score in terms of racial identification (coded as White and racial/ethnic minority), education (coded as 2-year college degree or higher and less than 2-year college degree), or work status (coded as employed and unemployed). Based on these preliminary analyses, none of the demographic variables were included as covariates in the structural analyses.

Measurement Model

With the exception of the RMSEA, all goodness-of-fit statistics exceeded the specified guidelines, $\chi^2(137) = 857.87$; CFI = .970; NNFI = .962; RMSEA = .082 (90% CI = .077–.088); SRMR = .047. The upper limit of the 90% RMSEA CI did not exceed specified guidelines. All of the indicators significantly (ps $< .01$) loaded on their respective constructs (ranges of completely standardized indicator loadings were uncertainty = .86–.91, ambiguity = .69 and .91, frustration = .76–.89, negative emotion = .70–.91, physical discomfort = .62 and .76, health anxiety = .26–.78). The latent factor correlations are presented in Table 1. The distress tolerance constructs shared moderate-to-strong correlations (magnitude of rs ranged from .32 to .82). As predicted, intolerance of uncertainty, ambiguity, negative emotion, frustration, and physical discomfort significantly correlated with health anxiety (magnitude of rs ranged from .44 to .75).

Structural Regression Model

The structural regression model had the same number of estimated parameters and thus produced an identical fit to the data as the measurement model, $\chi^2(137) = 857.87$; CFI = .970; NNFI = .962; RMSEA = .082 (90% CI = .077–.088); SRMR = .047. The completely standardized path coefficients from the structural regression model are presented in Figure 1. As shown, intolerance of uncertainty, negative emotion, and physical discomfort were the only distress tolerance constructs to account for unique variance in health anxiety scores. Among these three predictors, intolerance of physical discomfort shared an especially strong unique association with health anxiety. Collectively, the distress tolerance constructs accounted for a substantial amount of variance in health anxiety scores ($R^2 = .63$).

Discussion

This study sought to elucidate the facets of distress tolerance that are relevant to health anxiety via providing the first known simultaneous investigation of associations between five facets of distress

TABLE 1. Latent Correlations Between Distress Tolerance and Health Anxiety

Variable	1	2	3	4	5	6
1. Health anxiety	—					
2. Intolerance of uncertainty	.70**	—				
3. Intolerance of ambiguity	.52**	.75**	—			
4. Intolerance of frustration	.66**	.82**	.58**	—		
5. Intolerance of negative emotion	.44**	.53**	.45**	.48**	—	
6. Intolerance of physical discomfort	.75**	.71**	.48**	.71**	.32**	—

Note. $N = 830$.
**$p < .01$, two-tailed.

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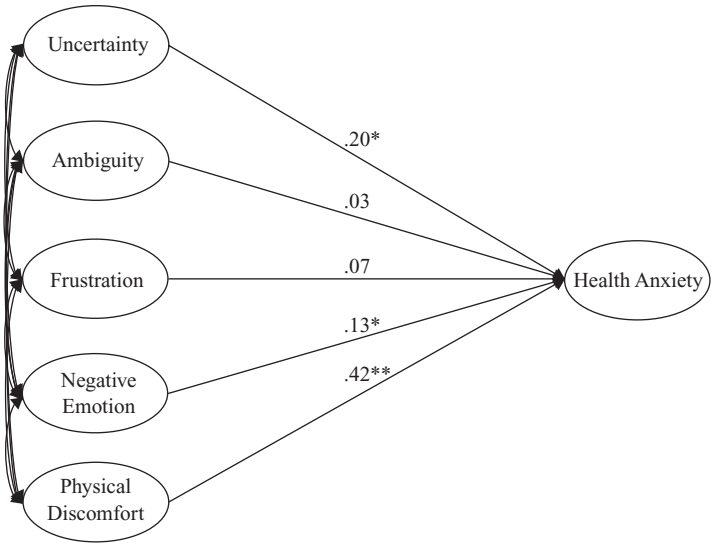

Figure 1. Standardized path coefficients from structural regression model examining unique associations between each distress (in)tolerance construct and health anxiety.
$^{*}p < .05$. $^{**}p < .01$, two-tailed.

tolerance (intolerance of uncertainty, ambiguity, frustration, negative emotion, and physical discomfort) and health anxiety. Prior studies have focused on associations between two facets of distress tolerance (intolerance of uncertainty, physical discomfort) and health anxiety. However, targeting intolerance of uncertainty or physical discomfort in isolation from the other facets of distress tolerance limits our understanding of how distress tolerance relates to health anxiety. More precisely, intolerance of uncertainty and physical discomfort share strong associations with one another and the other three facets of distress tolerance. In addition, there is conceptual rationale as to why facets of distress tolerance other than intolerance of uncertainty and physical discomfort are relevant to health anxiety. It was thus necessary to account for all five facets of distress tolerance in an attempt to identify which facets of distress tolerance incrementally contribute to our understanding of health anxiety.

We found that all five facets of distress tolerance are significantly associated with health anxiety. Distress tolerance accounted for a substantial amount of variance in health anxiety scores, suggesting that distress tolerance is highly relevant to health anxiety. The facets of distress tolerance all shared moderate to strong intercorrelations, which is consistent with the assertion that these five facets all tap the same overarching construct (i.e., distress [in]tolerance; Zvolensky et al., 2010). The distinctiveness of the distress tolerance constructs was highlighted in the structural regression analyses in which only intolerance of uncertainty, negative emotion, and physical discomfort accounted for unique variance in health anxiety scores when accounting for the overlap among the facets of distress tolerance. Intolerance of physical discomfort was the only facet that shared a relatively strong unique association with health anxiety.

Whereas researchers speculate that distress tolerance could have transdiagnostic importance (Zvolensky et al., 2010), preliminary research suggests that the intolerance of physical discomfort may actually be relevant to only certain symptom types. More precisely, Norr et al. (2013) found that intolerance of physical discomfort failed to share a unique association with obsessive-compulsive symptoms, social anxiety, or worry after accounting for other covariates, including intolerance of uncertainty and negative emotion. Prior research has established the relevance of intolerance of physical discomfort to panic symptoms (Schmidt et al., 2006). Taken with prior findings, the observed unique association between intolerance of physical discomfort and health anxiety in this

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study provides additional support for the idea that intolerance of physical discomfort may only underlie forms of psychopathology marked by a fear of body sensations (Norr et al., 2013).

Whereas intolerance of physical discomfort may be relatively specific to certain forms of psychopathology, the present results provide further evidence that intolerance of uncertainty and negative emotion are broadly relevant to anxiety (Carleton, 2012; Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010). The uncertainty surrounding body sensations may evoke especially high levels of health anxiety for individuals who are intolerant of uncertainty (Deacon & Abramowitz, 2008; Fergus & Bardeen, 2013; Fetzner et al., 2014). Individuals who are intolerant of negative emotion are believed to be especially likely to engage in avoidance behavior when they experience negative affective states as a way to mitigate their distress (Keough et al., 2010). Reassurance-seeking behavior is a common form of avoidance behavior seen within health anxiety. Although it temporarily reduces health anxiety, reassurance-seeking behavior serves to maintain and further exacerbate health anxiety in the long term (Taylor & Asmundson, 2004).

As described, intolerance of physical discomfort shared the largest unique association with health anxiety, with intolerance of uncertainty and negative emotion evidencing much more modest unique associations. One implication of the observed pattern of unique associations is that increasing tolerance of physical discomfort may be an especially important target of intervention to reduce health anxiety. Some treatments have sought to increase tolerance of physical discomfort among individuals via challenging dysfunctional beliefs, exposing them to previously avoided illness-related situations, and having them engage in response prevention when they experience bothersome body sensations in their daily living (Langlois & Ladouceur, 2004). Interoceptive exposure may be another intervention strategy useful for increasing tolerance of physical discomfort. For example, Walker and Furer (2008) suggested that individuals with health anxiety may become more accepting of physical sensations through the completion of interoceptive exposure. Following from Walker and Furer, and the present findings, it is possible that interoceptive exposure may reduce health anxiety by increasing one's tolerance for physical discomfort. It will be important in future research to test this hypothesis using longitudinal and experimental methodology.

The aforementioned considerations must be considered with the following study limitations in mind. We operationalized distress tolerance in accordance with the only known published study to evaluate Zvolensky et al.'s (2010) conceptualization (Bardeen et al., 2013). It is important to note that other conceptualizations of distress tolerance exist, such as McHugh and Otto's (2012) conceptualization. Although McHugh and Otto's conceptualization overlaps with Zvolensky et al.'s conceptualization (e.g., both include intolerance of frustration and negative emotion), there are notable differences. In particular, McHugh and Otto conceptualize distress tolerance as a unidimensional construct and view anxiety sensitivity as being a facet of distress tolerance, whereas Zvolensky et al. do not. Importantly, research has shown that intolerance of physical discomfort is uniquely associated with health anxiety when controlling for anxiety sensitivity (Fergus & Valentiner, 2010). Nonetheless, examining associations between health anxiety and other conceptualizations of distress tolerance seems like an important area for future research.

It is important to acknowledge that the quality of data obtained via remote collection efforts remains an issue to be fully vetted in the psychopathology literature. Known methods shown to increase the quality of remotely collected data were used in the present research (e.g., using only high reputation MTurk workers; Peer et al., 2014) and research supports MTurk as a viable method for data collection when interested in clinical phenomena (Shapiro et al., 2013). Whereas MTurk samples tend to be more diverse than standard Internet samples or American undergraduate samples, MTurk samples should not be considered representative of the general population (Buhrmester et al., 2011; Paolacci & Chandler, 2014). The generality of these findings would be supported by examining other groups of nonclinical respondents.

Although health anxiety appears best conceptualized as a dimensional construct, thus supporting the use of an unselected sample, replication of the present results among clinical

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respondents will be important in ensuring their generalizability. Given the dimensionality of health anxiety and the likewise dimensional analyses, we believe the present results are meaningful. However, it should be noted that the respondents were not asked questions about their physical health status. Studies examining health anxiety often exclude participants who endorse being diagnosed with a physical health problem to ensure health status minimally contributes to health anxiety (Abramowitz, Deacon, & Valentiner, 2007). Health anxiety evidences a parallel structure among individuals who are physically healthy versus individuals with a physical health problem, indicating that the construct manifests itself similarly among both groups of respondents (Alberts, Sharpe, Kehler, & Hadjistavropoulos, 2011). Replication of these findings while accounting for the physical health of respondents, though, is warranted.

An additional limitation is the use of a cross-sectional, self-report study design because the present data are unable to speak to temporal relations among the study variables and the use of only self-report data could have inflated observed associations. It will be important to extend the present results using longitudinal and experimental studies. One advantage of the present methodology was that it allowed for a simultaneous investigation of relations among five facets of distress tolerance and health anxiety, which was deemed to be an important analysis given the current state of the literature. It is customary in SEM to use multiple indicators per construct, which can help reduce the likelihood that findings are attributable to the idiosyncrasies of a single measure. In the present study, multiple constructs were represented by separate scales of the same measure. Furthermore, and consistent with prior studies, the perceptual scale of the MIHT evidenced a weaker loading on the health anxiety construct relative to the other MIHT scales (Stewart et al., 2008). To address such limitations, future studies may seek to replicate the present findings using multiple, separate scales of each construct. Finally, we specifically focused on the perceived capacity to withstand negative emotional and/or other aversive states rather than the behavioral act to withstand an acute aversive state (Zvolensky et al., 2010). Preliminary evidence suggests that health anxiety is related to behavioral tasks linked to the ability to withstand physical discomfort, such as on the cold pressor task (Hadjistavropoulos, Craig, & Hadjistavropoulos, 1998). Future research should continue to examine the association between health anxiety and the behavioral act to withstand physical discomfort.

Limitations notwithstanding, distress tolerance appears highly relevant to health anxiety. Given that distress tolerance is often conceptualized as a multidimensional construct, the present results help elucidate the facets of distress tolerance that are particularly relevant to health anxiety. These facets include intolerance of uncertainty, negative emotion, and physical discomfort. Because intolerance of physical discomfort shares the strongest unique association with health anxiety, future studies that specifically focus on this facet of distress tolerance in relation to health anxiety may ultimately lead to the development and routine use of specialized psychological interventions for health anxiety that increase tolerance of physical discomfort.

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