

Differential patterns of physical symptoms and subjective processes in generalized anxiety disorder and unipolar depression

A. Aldao^{a,1}, D.S. Mennin^{a,*}, E. Linardatos^b, D.M. Fresco^{b,2}

^a Department of Psychology, Yale University, P.O. Box 208205, New Haven, CT 06520, United States

^b Department of Psychology, Kent State University, 226 Kent Hall Annex, P.O. Box 5190, Kent, OH 44242, United States

ARTICLE INFO

Article history:

Received 3 August 2009

Received in revised form 28 November 2009

Accepted 6 December 2009

Keywords:

Generalized anxiety disorder

Unipolar depression

Emotion

Intolerance of uncertainty

Muscle tension

Gastrointestinal symptoms

ABSTRACT

Given the substantial comorbidity between generalized anxiety disorder (GAD) and unipolar depressive disorders (UDDs), some have suggested that these disorders be combined in future editions of the DSM. However, decisions regarding nosology should not only account for current manifestations of symptom profiles, but also the potential diagnostic utility of associated characteristics, which, given past research, may suggest greater distinctiveness between these disorder classes. In the present investigation, we examined the role of one-item indices of physical, emotional/motivational, and cognitive symptoms in differentiating GAD from UDDs. We assessed these symptoms with one-item measures in order to provide an initial examination of the viability of these constructs as diagnostic criteria. In Study 1, in an unselected college sample, muscle pains and aches, gastrointestinal symptoms, emotion intensity, and intolerance of uncertainty were associated with GAD symptoms; conversely, low positive affect was associated with UDDs symptoms. In Study 2, we extended these findings to a clinical population and found that muscle pains and aches, positive affect, goal motivation, emotion intensity, and intolerance of uncertainty were higher in GAD than in UDDs.

© 2009 Elsevier Ltd. All rights reserved.

1. Introduction

Generalized anxiety disorder (GAD) has historically received less conceptual attention as compared to other anxiety disorders (Dugas, 2000). Given diagnostic modifications throughout various editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM), delineating the essential pathological components of GAD was initially difficult and likely contributed to a slowing of its conceptual development. For instance, the criteria for GAD in the revised third edition of the Diagnostic and Statistical Manual (DSM-III-R; APA, 1987) included a number of symptoms that reflected acute arousal of the autonomic nervous system (ANS), which made it challenging to disentangle GAD from panic disorder (Marten et al., 1993; Starcevic, Fallon, Uhlenhuth, & Pathak, 1994). Not surprisingly, the resultant diagnostic specificity was poor, as can be shown by studies that attempted to discriminate patients with GAD from individuals with other

anxiety disorders (Di Nardo, Moras, & Barlow, 1993; Mannuzza et al., 1989). In DSM-IV (APA, 1994), further clarification of the diagnosis was achieved with the designation of uncontrollable worry and physical symptoms related to heightened chronic arousal (e.g., muscle tension) as well as the elimination of some of the symptoms that reflected acute ANS arousal (e.g., tachycardia, nausea).

Although these changes to the GAD criteria have improved reliability of the disorder (Brown, Di Nardo, Lehman, & Campbell, 2001), distinguishing GAD from other conditions has remained challenging. For example, although modifications enacted in DSM-IV have effectively decreased overlap with panic disorder, GAD remains characterized by prominent comorbidity. In addition to its comorbidity with other anxiety disorders, GAD has demonstrated particularly high diagnostic overlap with unipolar depressive disorders (i.e., “UDDs”) including major depression and dysthymic disorder (Hettema, 2008; Kessler et al., 2005a, 2005b). To address the high levels of comorbidity between GAD and UDDs, investigators have drawn from structural investigations of genotypic and phenotypic emotional characteristics and have suggested that these disorders be combined into a “distress disorder” category (Krueger, 1999; Vollbergh et al., 2001; Watson, 2005; Watson, O’Hara, & Stuart, 2008). This new category would also include

* Corresponding author. Tel.: +1 203 432 2516; fax: +1 203 432 7172.

E-mail addresses: amelia.aldao@yale.edu (A. Aldao), doug.mennin@yale.edu (D.S. Mennin), elinarda@kent.edu (E. Linardatos), fresco@kent.edu (D.M. Fresco).

¹ Tel.: +1 203 432 2516.

² Tel.: +1 330 672 4049.

posttraumatic stress disorder (PTSD) and, thus, result in a separation of GAD and PTSD from the rest of the anxiety disorders.

Although intuitively appealing given its parsimony in addressing these overlap issues, combining these disorders into one category ignores key issues in the relationship between GAD and UDDs including: (1) inclusion of physical symptom criteria that obscure between-group differences (e.g., difficulty sleeping) and exclusion of physical symptom criteria that may be more likely to demonstrate specificity (e.g., gastrointestinal symptoms; Hazzlett-Stevens, Craske, Mayer, Chang, & Naliboff, 2003); (2) distinctions in emotional and motivational processes (Mennin, Holoway, Fresco, Moore, & Heimberg, 2007); and (3) cognitive processes that have been shown to differentiate these disorders such as intolerance of uncertainty (Dugas, Buhr, & Ladouceur, 2004).

1.1. Specificity in physical symptoms

Examination of the diagnostic criteria for GAD reveals that four out of the six associated physical symptoms (i.e., restlessness, fatigue, difficulty concentrating, and sleep difficulties) are also part of the diagnostic criteria for MDD (e.g., Mennin, Heimberg, Fresco, & Ritter, 2008) and three out of the six associated symptoms (e.g., fatigue, difficulty concentrating, and sleep difficulties) are part of the diagnostic criteria for dysthymic disorder. Consequently, although the GAD physical symptoms have shown discriminant validity between GAD and the rest of the anxiety disorders (e.g., Marten et al., 1993), they have not shown strong discrimination between GAD and UDDs (Brown, Marten, & Barlow, 1995); one exception being difficulty concentrating, which Joormann and Stoeber (1999) found to be more strongly related to depressive symptoms than to worry. Given the high overlap between the diagnostic symptoms, it is not surprising that many similarities are found when comparing GAD and UDDs (e.g., Watson et al., 2008).

One way to address physical symptom overlap is to incorporate additional symptoms that might increase specificity between GAD and the UDDs (Barlow & Winze, 1998). A possibility is to focus on pain, given recent work suggesting that muscular and stomach pain might be associated with GAD (Beesdo et al., 2009) and could potentially differentiate this disorder from UDDs (Means-Christensen, Roy-Byrne, Sherbourne, Craske, & Stein, 2008). Indeed, muscle tension, which is part of the diagnostic criteria of GAD but not of UDDs, has shown subjective and physiological specificity to GAD and differentiation from UDDs (Hoehn-Saric & McLeod, 1988; Hoehn-Saric, McLeod, & Zimmerli, 1989; Joormann & Stoeber, 1999). Similarly, evidence suggests that gastrointestinal symptoms might be important for the diagnosis of GAD. In this respect, Kubarych, Aggen, Hetttema, Kendler, and Neale (2005) found that the item reflecting nausea or stomach distress (which was removed in DSM-IV) was endorsed more frequently than some of symptoms that were retained. Similarly, Starcevic and Bogojevic (1999) found that nausea or stomach distress was among the most frequently endorsed symptoms in GAD. Additionally, individuals scoring high on worry and anxiety have more doctor visits and present with more gastric complaints than those low in worry and anxiety (Belanger, Ladouceur, & Morin, 2005). Lastly, irritable bowel syndrome (IBS) has been associated with GAD, worry, and intolerance of uncertainty (Blanchard, Scharff, Schwartz, Suls, & Barlow, 1990; Drews & Hazzlett-Stevens, 2008; Gros et al., 2009; Hazzlett-Stevens et al., 2003; Keefer et al., 2005), but also with the rest of the mood and anxiety disorders (e.g., Garakani et al., 2003; Lydiard et al., 2005; Masand, Kaplan, Gupta, & Bhandary, 1997) thus producing equivocal evidence of the specificity of gastrointestinal symptoms.

1.2. Specificity in emotionality

Structural models of affect indicate that negative affect is associated with each of the anxiety and mood disorders (Brown, Chorpita, & Barlow, 1998; Clark & Watson, 1991; Mineka, Watson, & Clark, 1998; Watson, 2005; Watson et al., 2008). Brown et al. (1998) examined symptom structure in a sample of outpatients with mood and anxiety disorders and found that the best fitting model consisted of higher order factors of negative affect, positive affect, and autonomic arousal. However, whereas all the disorders (MDD, dysthymic disorder, GAD, panic disorder, social anxiety, and obsessive compulsive disorder) loaded on negative affect, *only* UDDs and social anxiety disorder loaded (negatively) on positive affect. Converging evidence comes from empirical studies showing diminished subjective and expressive emotional responses to positive stimuli in depression (Sloan, Bradley, Dimoulas, & Lang, 2002; Sloan, Strauss, Quirk, & Sajatovic, 1997). Moreover, low positive affect has been associated with diminished approach motivation (Germans & Kring, 2000). Consequently, approach motivation has also shown negative associations with UDDs, but no relationship with the anxiety disorders (Depue, Krauss, & Spont, 1987; Henriques, Glowacki, & Davidson, 1994; Johnson, Turner, & Iwata, 2003; Kring & Bachorowski, 1999; Shankman, Klein, Tenke, & Bruder, 2007).

In addition to positive affect, emotional arousal, as manifested subjectively, has emerged as a possible candidate to increase the specificity of GAD. Along these lines, emotion intensity, conceptualized as the subjective strength of an emotional response, has been found to be elevated in GAD (Mennin, Heimberg, Turk, & Fresco, 2005) and recent studies have found emotion intensity to be higher in GAD than in UDDs (Kerns, Aldao, & Mennin, 2008; Mennin et al., 2007).

1.3. Specificity in cognitive process

A cognitive construct that has shown greater elevations in GAD compared to MDD is intolerance of uncertainty, which reflects the extent to which one believes that uncertainty is unacceptable (see Dugas et al., 2004a, 2004b). In a number of correlational and experimental studies, Dugas et al. have demonstrated a central role for intolerance of uncertainty in GAD, independent of its relationship with worry (e.g., Ladouceur, Talbot, & Dugas, 1997; Laugesen, Dugas, & Bukowski, 2003; Robichaud, Dugas, & Conway, 2003). Further, these investigators have shown that intolerance of uncertainty discriminated individuals with GAD from non-anxious controls (Dugas, Gagnon, Ladouceur, & Freeston, 1998) and other anxiety disorders (Ladouceur et al., 1999). Most germane to the current investigation, intolerance of uncertainty has been found to discriminate individuals with GAD from those with major depression (Dugas et al., 2004a, 2004b). An important next step in our understanding of intolerance of uncertainty in GAD consists of evaluating how it can be used *diagnostically* to differentiate GAD from UDDs. Given that our current diagnostic manuals (e.g., DSM-IV; APA, 2000) are based on one-item measures of constructs (e.g., excessive anxiety and worry), it is necessary to determine whether a one-item measure of intolerance of uncertainty can produce differentiation between GAD and UDDs on par with that produced by longer measures of this construct.

1.4. Present investigation

Given the potential for these constructs to provide greater specificity between these conditions, it may be premature to combine these diagnoses into a single diagnostic entity. Following a suggestion by Brown et al. (2001), GAD could be further refined to promote better separation from the mood disorders. One sugges-

tion has been to modify the somatic symptoms criteria (Barlow & Wincze, 1998), especially since Brown et al. (1995) found that many patients without GAD endorsed three of these associated symptoms. Following these suggestions, in the present investigations we examined the potential of these variables to differentiate these disorders. Since our interest was to provide an initial examination of the viability of these constructs as diagnostic criteria, we utilized single item measures of these constructs as individual items are best reflective of DSM-IV diagnostic criteria (APA, 2000). Indeed, assessments of diagnostic criteria such as clinical interviews (e.g., Structured Clinical Interview for DSM-IV; First, Spitzer, Gibbon, & Williams, 2002) and self-report measures (e.g., Generalized Anxiety Disorder-Questionnaire-IV; Newman et al., 2002) typically utilize a single item per diagnostic criterion.

We evaluated these relationships in two studies: In Study 1, we examined an unselected undergraduate sample and, in Study 2, we examined a sample of community-derived participants with a clinical diagnosis of GAD or UDDs. Utilizing these two samples allowed us to evaluate the relationship among the constructs of interest (i.e., GAD and UDDs) both continuously (i.e., symptoms) and discretely (i.e., diagnostic categories) in samples differing in the clinical severity of the disorders. In Study 2, we compared GAD with a UDD group that included both MDD and dysthymic disorder. Given that the nosological independence of GAD has been questioned in relation to both mood disorders and that suggestions for subsuming GAD within the mood disorders have included it being combined with both UDDs (i.e., “distress” disorders; Watson, 2005), we compared GAD to a combined UDD group as a conservative test of the potential independence of these conditions. Further, to address overlapping symptoms between disorders, in the undergraduate sample we covaried the symptoms from the other disorder in regression analyses, and in the clinical sample we examined groups with either GAD or a UDD, a comorbid group consisting of individuals meeting diagnostic criteria for either, or neither type of disorder.

In Study 1 (i.e., undergraduate sample), we predicted that muscle pains and aches, gastrointestinal symptoms, emotion intensity, and intolerance of uncertainty would be related to GAD symptoms even when accounting for the presence of UDDs symptoms. Similarly, we expected that low levels of positive mood and goal motivation would be specific to UDDs symptoms when controlling for GAD symptoms. In Study 2 (i.e., diagnostic sample), we predicted that these constructs would differentiate GAD from UDDs. Specifically, we hypothesized that muscle pains and aches, gastrointestinal symptoms, emotion intensity, and intolerance of uncertainty would be higher in GAD than in UDDs and control participants. Conversely, we predicted that positive affect and goal motivation would be diminished in participants with UDDs compared to GAD and control participants. Additionally, we explored each construct in the comorbid group: an effect of equivalent magnitude in the comorbid group and the GAD group would suggest that the construct is GAD-driven, whereas a similar effect in the comorbid and UDD groups would suggest that the construct is driven by UDDs.

2. Study 1

2.1. Method

2.1.1. Participant and procedures

Participants were 783 undergraduate students enrolled in an introductory level psychology course at a large Midwestern university who received credit towards fulfilling a class requirement in exchange for voluntary participation. They were assessed in groups and were asked to complete a battery of self-reported measures including those used in the present study (detailed

below). In terms of the gender distribution, 61.9% identified as female, 37.3% individuals identified as male, and the remaining .8% did not identify their gender. The mean age of this sample was 19.23 (SD = 2.27). The ethnic composition was as follows: 84.9% Caucasian, 8.3% African American, 1.4% Asian American, 1.3% Hispanic, .3% Native American, 2.9% identified as “other,” and .9% did not disclose their ethnicity. The demographics for this study are consistent with the general population of the university in which participants were recruited.

2.1.2. Measures

2.1.2.1. Physical Symptoms Scale. The *Physical Symptoms Scale* (PSS) was created for the purposes of this study to assess muscle tension and gastrointestinal distress. Given the heterogeneity of symptoms of muscle tension and gastrointestinal distress, we administered 9 items that assessed a variety of symptoms, including items that have a low base rate (e.g., ulcers). Specifically, the symptoms assessed were: sore jaw muscles, headaches, neck aches, and heartburn, ulcers, excessive gas, constipation, and other gastrointestinal problems (i.e., gastrointestinal distress). Participants rated how frequently they have experienced each of these symptoms in the last six months on a 9-point scale ranging from 0 (“not at all”) to 8 (“extremely”). The time frame of six months was chosen to be consistent with the time frame with which worry is currently assessed in DSM-IV (APA, 2000).

To verify that these symptoms did correspond to the two distinct domains of muscle pains and aches and gastrointestinal difficulties, we conducted factor analyses in a separate sample of 389 students who filled out the PSS as part of prescreening procedures conducted in large lecture classes. These procedures took place over the course of two semesters at the same Midwestern university as the main sample in this study so, as expected, the demographics were similar (i.e., the mean age was 19.03, 68.6% of the sample identified as female, and 87.1% identified as Caucasian). We removed duplicated cases of participants who provided data for both samples. Factor 1 accounted for 39.33% of the variance (eigenvalue 3.54) and consisted of headaches, neck aches, backaches, and sore jaw muscles, thus reflecting the hypothesized “muscle pains and aches” factor. Factor 2 accounted for an additional 17.73% of the variance (eigenvalue 1.60) and consisted of heartburn, ulcers, excessive gas, constipation, and other gastrointestinal problems, thus reflecting the hypothesized “gastrointestinal difficulties” factor.³ We used the findings from this factor analysis to create two corresponding composite scores for the analyses on the main study sample (as well as the diagnostic sample in Study 2). These scores consisted of the sum of the scores on their individual items. The first summated score, “muscle pains and aches”, consisted of 4 items and ranged from 0 to 32 and the second summated score ($\alpha = .81$), “gastrointestinal symptoms”, consisted of 5 items and ranged from 0 to 40 ($\alpha = .78$).

2.1.2.2. Depression and GAD measures. *Beck Depression Inventory II* (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item measure of depression symptoms, covering the affective, cognitive, behavioral, somatic, and motivational domains. Each symptom is rated on a 4-point scale, with higher scores indicating more depressive symptoms. Total scores can range from 0 to 63. It has a high internal consistency (Beck et al., 1996; in our sample, $\alpha = .94$) and has been extensively used in the literature. For the purposes of this

³ These findings were replicated with both a Varimax rotation, in which factors are hypothesized to be orthogonal, and a Direct Oblimin rotation, in which factors are hypothesized to correlate strongly with one another (Tabachnick & Fidell, 2001).

investigation, we added two questions to the BDI-II that measured goal motivation and positive affect that were not part of the calculations for the total score. They were presented in a format similar to the BDI-II, thus ranging from 0 (“I am not motivated to achieve goals” or “there is no change in my ability to be happy”) to 3 (“I am extremely motivated to achieve goals” or “I have not been feeling any happiness, content, or joy in my life”). Higher scores on the goal motivation item represented more goal motivation. Scores on the positive affect item were reversed so that higher scores represented more positive affect. These two additional items were not incorporated into the total score for the BDI-II.

Generalized Anxiety Disorder Questionnaire-IV (GADQ-IV; Newman et al., 2002) is a 9-item inventory that assesses for GAD as delineated in DSM-IV (APA, 1994). Most items are dichotomous and measure the excessiveness and uncontrollability of worry. One item is open-ended and asks for a list of the most frequent worry topics. Two items are on a scale from 0 to 8 and measure the clinical distress and functional impairment associated with excessive worry and anxiety. Six items ask about the physical symptoms outlined in the DSM-IV criteria for GAD. Typically, these items are assessed in a yes/no format. For the purposes of this study, we assessed the DSM-IV symptoms on a 9-point scale in order to be congruent with the physiological symptoms. In order to calculate the total GADQ-IV score, we coded a DSM-IV symptom as present if it was given a rating of 4 or higher and absent if it was given a score lower than 4.

A dimensional score was used in the regression analyses. This dimensional score was similar to the one suggested by Newman et al. (2002). However, the scoring system proposed by Newman has a skip-out rule, under which, if an individual does not endorse worrying for more days than not over the course of six months, she or he is instructed not to respond to the following questions that assess the associated symptoms, distress, and impairment. The total scores range from 0 to 13 (Newman et al., 2002). Because this scoring system makes the associated symptoms, distress, and interference questions dependent on the response to a previous question, it produces a distribution that is not continuous and highly skewed. Additionally, for each individual for which the skip-out is applied, the variance in the associated symptoms is eliminated, and since we were precisely interested in the variance in associated symptoms (both the current ones and the novel ones we propose), keeping the variance associated with the symptoms was fundamental. Thus, similar to others (e.g., Roemer et al., 2009), we did not apply the skip-out rule and instead asked our participants to fill out all questions on the GADQ-IV. This score has been shown to be highly correlated ($r = .95$; $p < .001$) with the original scoring system (Rodebaugh, Holaway, & Heimberg, 2008).

We also added a one-item measure of intolerance of uncertainty (i.e., “during this same period, did you often have difficulty tolerating the anticipation of uncertain events?”) and emotion intensity (i.e., “whenever you experience emotions, how intense are they”) to the GAD-Q-IV. These items were presented on

a 9-point scale, ranging from 0 (“not at all”) to 8 (“extremely”), similar to the physical symptoms above. However, these additional items were not incorporated into total score calculations.

2.1.2.3. Subjective process measures. The *Affect Intensity Measure (AIM; Larsen, 1984)* is a 40-item inventory that assesses the intensity (i.e., characteristic magnitude of emotions people feel) and reactivity (i.e., characteristic strength of people's responses to emotional stimuli) of individual's subjective experience of positive and negative emotions. The AIM is scored on a 6-point scale in which higher scores indicate greater intensity or reactivity. Findings indicate that the AIM possesses high test-retest reliability (Larsen, 1984) and high internal consistency, both when deriving the total score as well as when calculating different factors (Bryant & Yarnold, 1996). Weinfurt, Bryant, and Yarnold (1994) derived a four-factor solution differentiating intensity from reactivity in the positive and negative affect dimensions. For the purposes of this investigation, we used the subscales that measure negative intensity ($\alpha = .70$) and positive intensity ($\alpha = .88$).

The *Difficulties with Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)* is a 36-item inventory that assesses emotion dysregulation in six dimensions. It can be calculated as a total score or as 6 subscales, and we utilized the Difficulties Engaging in Goal Directed Behavior Subscale, which consists of 5 items that reflect difficulties accomplishing goals when experiencing negative emotions. Items are rated on a 5-point scale, with higher scores associated with higher dysregulation. The total score for this subscale ranges from 5 to 25 ($\alpha = .82$). It has demonstrated construct and predictive validity (Gratz & Roemer, 2004).

The *Intolerance of Uncertainty Scale (IUS; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994)* is a 27-item inventory that measures emotional, cognitive, and behavioral reactions to ambiguous situations, implications of being uncertain, and attempts to control the future. Items are rated on a 5-point scale, where higher scores indicate more intolerance of uncertainty. The total score can range from 7 to 135. The IUS demonstrates high internal consistency ($\alpha = .95$ in our sample), test-retest reliability (Buhr & Dugas, 2002), and discriminant ability between GAD and non-anxious controls (Dugas et al., 1998) and other anxiety disorders (Ladouceur et al., 1999).

2.2. Results

To support the validity of the one-item subjective measures, we first correlated these items with validated measures that assess the constructs of interest (see Table 1). Specifically, positive affect was positively correlated with AIM Positive Affectivity ($r = .18$, $p < .01$), emotion intensity was positively correlated with AIM Positive Affectivity ($r = .11$, $p < .01$) and AIM Negative Intensity ($r = .39$, $p < .01$), goal orientation was negatively correlated with DERS Difficulties with Goals ($r = .10$, $p < .01$), and intolerance of uncertainty was positive correlated with IUS ($r = .51$, $p < .01$).

Table 1

Bivariate correlations between one-item measures of subjective processes and validated scales (Study 1).

Variables	2	3	4	5	6	7	8	Mean (SD).
1. Positive affect	.0	-.17**	-.27**	-.30	.18**	-.27**	.44**	2.66 (.63)
2. Goal motivation		.05	.01	-.07*	.10**	-.10**	-.08*	1.40 (1.07)
3. Emotion intensity			.50**	.39**	.11**	.31**	.31**	4.17 (1.65)
4. Intolerance of uncertainty				.38**	.06	.41**	.51**	2.96 (1.86)
5. AIM Negative Intensity					.10**	.52**	.45**	32.87 (6.82)
6. AIM Positive Affectivity						.10*	-.04	65.51 (13.51)
7. DERS Difficulties with Goals							.47**	13.60 (4.43)
8. IUS								52.81 (18.11)

Note: AIM – Affect Intensity Measure; DERS – Difficulties in Emotion Regulation Scale; IUS – Intolerance of Uncertainty Scale.

* $p < .05$.

** $p < .01$.

Table 2
Predicting GAD-Q-IV and BDI-II scores with the one-item measures (Study 1).

Predicting GAD-Q-IV scores					Predicting BDI-II scores				
	ΔR^2	B	SeB	β		ΔR^2	B	SeB	β
Step 1	.57				Step 1	.58			
Muscle pains and aches		.11	.01	.24**	Muscle pains and aches		.20	.04	.14**
Gastrointestinal symptoms		.11	.02	.20**	Gastrointestinal symptoms		.21	.05	.12**
Positive affect		-.90	.12	-.19**	Positive affect		-8.93	.39	-.57**
Emotion intensity		.37	.05	.20**	Emotion intensity		.57	.16	.10**
Goal motivation		.01	.07	.01	Goal motivation		-.32	.22	-.03
Intolerance of uncertainty		.48	.05	.29**	Intolerance of uncertainty		.69	.15	.13**
Step 2	.06				Step 2	.06			
Muscle pains and aches		.08	.01	.18**	Muscle pains and aches		.07	.04	.05
Gastrointestinal symptoms		.08	.01	.15**	Gastrointestinal symptoms		.08	.05	.04
Positive affect		.17	.15	.03	Positive affect		-7.84	.37	-.50**
Emotion intensity		.30	.05	.16**	Emotion intensity		.12	.15	.02
Goal motivation		.05	.06	.02	Goal motivation		-.33	.20	-.04
Intolerance of uncertainty		.40	.05	.24**	Intolerance of uncertainty		.11	.15	.02
BDI-II scores		.12	.01	.39**	GAD-Q-IV scores		1.21	.11	.38**

Note: GAD-Q-IV – Generalized Anxiety Disorder Questionnaire IV (Newman et al., 2002) and BDI-II – Beck Depression Inventory II (Beck et al., 1996).

* $p < .05$.

** $p < .01$.

In order to analyze the role of the symptoms in discriminating GAD symptoms from UDDs symptoms, we conducted a series of stepwise regression analyses (Table 2). We first predicted GAD-Q-IV. In the initial step, we simultaneously entered the physical symptoms composite scores (muscle pains and aches items and gastrointestinal items) and the subjective items (positive affect, emotion intensity, goal orientation, and intolerance of uncertainty). All of them were significant except for goal motivation. In the second step, we added the BDI-II scores. Only the positive affect item was no longer significantly related to GAD-Q-IV.

We then predicted BDI-II scores. In the first step, we simultaneously entered the physical symptoms composite scores and the subjective items. Again, all were significant except for goal motivation. In the second step, we added GAD-Q-IV and, as a result, muscle pains and aches, gastrointestinal symptoms, emotion intensity, and intolerance of uncertainty were no longer significant predictors. Positive affect, however, remained a significant predictor. Together, the results from the regression analyses suggest that muscle aches and pains, gastrointestinal symptoms, emotion intensity, and intolerance of uncertainty were more strongly associated with GAD-Q-IV scores whereas positive affect was more strongly associated with BDI-II scores.

3. Study 2

3.1. Method

3.1.1. Participants and procedures

In this second study, we sought to replicate the previous findings by examining the physical symptoms and subjective processes in a diagnosed sample. To this end, we recruited individuals from community and clinical settings with a primary diagnosis of GAD or a UDD (i.e., major depressive disorder or dysthymic disorder). Each sample was collected by two of the authors (D.M. and D.F.), respectively. All participants were administered the Structured Clinical Interview Diagnosis for Axis I disorders (SCID; First et al., 2002) by graduate students and post-baccalaureate research assistants who were trained extensively in psychopathology and diagnostic assessment by D.M. or D.F. The reliability of diagnoses of these diagnosticians was found to be high for both GAD ($\kappa = .92$) and the unipolar disorders ($\kappa = 1.00$). No demographic or outcome differences were found between those participants collected by D.M. ($n = 122$) or D.F. ($n = 20$) or between those referred through the community ($n = 105$) or via departmental clinics ($n = 37$). There were no significant differences between

participants collected by D.M. and D.F. in terms of age ($t [136] = 1.91$, $p = .06$), gender ($[\chi^2 [1, N = 142] = .04$, $p = .85$), or number of secondary diagnoses of anxiety disorders ($t [82] = .06$, $p = .96$). Similarly, there were no significant differences between participants recruited from the community or departmental clinics in terms of age ($t [136] = .39$, $p = .69$), gender ($\chi^2 [1, N = 142] = .26$, $p = .61$), or number of secondary diagnoses of anxiety disorders ($t [82] = .27$, $p = .79$). There were, however, significant differences in terms of ethnicity between data collected by D.M. and D.F. ($\chi^2 [1, N = 140] = 6.37$, $p < .05$) and between participants recruited from the community or the departmental clinics ($\chi^2 [1, N = 140] = 5.59$, $p < .05$), with more Caucasian participants in the sample collected by D.M. and in departmental clinics. However, when entered in the analyses, ethnicity was non-significant ($p > .10$) and its inclusion did not affect results presented below.

The sample resulted in a total of 142 participants. Of these, 66.9% identified as female. In terms of the ethnic background, 62.7% identified as Caucasian, 9.2% as African American, 19% as Asian American, 5.6% as Hispanic, 2.1% as other, and the remaining 1.4% chose not to identify their ethnicity. The mean age for the sample was 27.72 (SD = 7.41). In this sample, 58 participants did not meet diagnostic criteria for any mood or anxiety disorder, 40 met a primary diagnosis of GAD (without comorbid MDD or dysthymic disorder; "GAD only"), 22 met a primary diagnosis of a UDD (MDD or dysthymic disorder without comorbid GAD; "UDD only")⁴ and 22 met diagnostic criteria for GAD and at least one UDD ("GAD + UDD")⁵. In all cases, comorbidities with other anxiety disorders were allowed, as long as GAD or UDDs were considered the primary diagnosis on the basis of symptom severity.

To determine primacy of symptom severity, the Clinician's Severity Rating (CSR) from the Anxiety Disorders Interview Schedule for DSM-IV (i.e., ADIS-IV CSR; Di Nardo, Brown, & Barlow, 1994) was utilized. CSR scores range from 0 to 8 with a 4 denoting clinically significant symptom severity. All primary diagnoses were assigned CSR scores above 4. Secondary diagnoses were also considered to be present when above 4 but must have

⁴ Of these individuals, three had a primary diagnosis of dysthymic disorder and no major depressive disorder, 17 had a primary diagnosis of major depressive disorder, and two had a primary diagnosis of major depressive disorder with comorbid dysthymic disorder (i.e., "double depression").

⁵ Of these individuals, one had a primary diagnosis of dysthymic disorder with major depressive disorder, four had a primary diagnosis of GAD and a secondary diagnosis of dysthymic disorder, 10 had a primary diagnosis of GAD and secondary diagnosis of major depressive disorder, and seven had a primary diagnosis of major depressive disorder and secondary GAD.

Table 3
Differences between diagnostic groups (Study 2).

Measure	GAD (<i>n</i> = 40)	UDD (<i>n</i> = 22)	GAD + UDD (<i>n</i> = 22)	Controls (<i>n</i> = 58)	
Muscle pains and aches	12.63 (7.06) ^{a,b}	8.09 (5.85) ^b	10.77 (7.84)	6.28 (5.01) ^a	$F = 8.82; \eta^2 = .161$
Gastrointestinal symptoms	5.55 (4.87) ^a	3.23 (3.24)	4.91 (6.03)	2.67 (4.49) ^a	$F = 3.44; \eta^2 = .07$
Positive affect	2.22 (.95) ^{a,b}	1.50 (.91) ^{a,c}	1.54 (1.06) ^b	2.57 (.94) ^c	$F = 10.12; \eta^2 = .18$
Emotion intensity	5.86 (1.50) ^{a,b}	4.81 (1.60) ^b	5.44 (1.20)	4.79 (1.87) ^a	$F = 3.49; \eta^2 = .08$
Goal orientation	1.55 (.88) ^a	1 (.69) ^{a,b}	1.18 (1.01)	1.84 (1.001) ^b	$F = 4.11; \eta^2 = .08$
Intolerance of uncertainty	5.15 (1.97) ^{a,b}	3.55 (2.04) ^{b,c,d}	5.50 (1.44) ^c	1.95 (2.06) ^{a,d}	$F = 29.34; \eta^2 = .39$

Notes: Means with the same subscript are significantly different at the .05 level. Some data were missing for the emotion intensity variable, resulting in the following sample sizes: GAD = 36; UDD = 16; GAD + UDD = 18; controls = 58.

been at least one point lower in severity than the primary GAD or UDD diagnosis. Additional secondary diagnoses included social anxiety disorder (*n* = 15), panic disorder (*n* = 7), specific phobia (*n* = 22), or obsessive-compulsive disorder (*n* = 2). There were no significant differences among the psychopathology groups in terms of the number of secondary diagnoses of anxiety disorders ($F [2,81] = 1.77, p = .18$). Additionally, participants with a diagnosis of bipolar disorder or substance abuse or dependence were excluded. Finally, there were no differences across the diagnostic groups in terms of age ($F [3,129] = .68, p = .57$) or gender ($\chi^2 [1, N = 142] = .62, p = .89$), and differences were marginally significant for ethnicity ($\chi^2 [1, N = 140] = 7.73, p = .05$). Specifically, those with GAD only and control groups were comprised of the greatest rates of individuals from ethnic majority groups relative to minority groups. As mentioned previously, ethnicity was a non-significant predictor and it did not affect the results of the analyses.

3.1.2. Measures

Following completion of the SCID, participants completed a battery of questionnaires, including the modified BDI-II and GAD-Q-IV administered in Study 1.

3.2. Results

To examine group differences in the one-item measures and physical symptoms composite scores, we first conducted univariate ANOVAs with diagnostic group as the between-group factor. We inspected variables for normality and conducted tests of heterogeneity of variance. The Levene Test indicated heterogeneity of variance for the muscle aches and pains composite score ($F [3,138] = 2.84, p < .05$) and goal motivation item ($F [3,138] = 2.71, p < .05$). We addressed this issue by conducting a square root transformation and as a result, the Levene test was non-significant for both, muscle aches and pains ($F [3,138] = .70, p = .56$) and goal orientation ($F [3,138] = .84, p = .47$). We then proceeded to run one ANOVA for each construct of interest. If group differences were found at the omnibus level, we conducted non-orthogonal planned contrasts to determine which groups were significantly different from one another. The contrasts were: GAD only and healthy controls; UDD only and healthy controls; GAD only and GAD + UDD; UDD only and GAD + UDD; and UDD only to healthy controls (see Table 3).

First, we examined the muscle tension composite score and found a significant main effect of diagnostic group ($F [3,138] = 8.82, p < .001, \eta^2 = .161$). Planned contrasts suggested that the GAD only group was significantly higher than the control group (CI: [.72, 1.68], $p < .001, L = 1.20$) and the UDD only group (CI: [.09, 1.32], $p < .05, L = .71$) but was not different from the GAD + UDD group (CI: [−.25, .98], $p = .31, L = .37$). Additionally, the UDD only group did not differ from the GAD + UDD group (CI: [−1.04, .36], $p = .34, L = −.34$) or the control group (CI: [−.09, 1.08], $p = .09, L = .50$).

Second, we examined group differences in the gastrointestinal symptoms composite score and found a significant main effect of

diagnostic group ($F [3,138] = 3.44, p < .05, \eta^2 = .07$). Planned contrasts suggested that the GAD only group was significantly higher than the control group (CI: [.96, 4.79], $p < .01, L = 2.88$), but only marginally different from the UDD only group (CI: [−1.48, 4.79], $p = .07, L = 2.32$) and not different from the GAD + UDD group (CI: [−1.83, 3.11], $p = .61, L = .64$). Additionally, those in the UDD only group did not differ from those in the GAD + UDD group (CI: [−4.48, 1.13], $p = .24, L = −1.68$) or the controls (CI: [−1.78, 2.89], $p = .64, L = .56$).

Third, we examined group differences on the one item measure of positive affect and found a main effect of diagnostic group ($F [3,138] = 10.12, p < .001, \eta^2 = .18$). Planned contrasts suggested that the GAD only group was not significantly different from the control group (CI: [−.73, .05], $p = .08, L = −.34$). However, it was significantly higher than the UDD only group (CI: [.22, 1.23], $p < .01, L = .73$) and the GAD + UDD group (CI: [.18, 1.18], $p < .01, L = .68$). Additionally, the UDD only group did not differ from GAD + UDD group (CI: [−.62, .53], $p = .88, L = −.05$) and was lower than the control group (CI: [−1.54, −.60], $p < .001, L = −1.07$).

Fourth, we examined group differences on the one item measure of goal motivation and found a main effect of diagnostic group ($F [3,138] = 4.11, p < .01, \eta^2 = .08$). Planned contrasts suggested that the GAD only group was not significantly different from the control group (CI: [−.31, .12], $p = .39, L = −.10$), significantly higher than the UDD only group (CI: [.01, .57], $p < .05, L = .29$), but not different than the GAD + UDD group (CI: [−.03, .53], $p = .08, L = .25$). Additionally, the UDD only group did not differ from the GAD + UDD group (CI: [−.35, .28], $p = .82, L = −.04$) and it was lower than the control group (CI: [−.65, −.12], $p < .01, L = −.38$).

Fifth, we examined group differences on the one item measure of emotion intensity and found a main effect of diagnostic group ($F [3,124] = 3.49, p < .05, \eta^2 = .08$).⁶ Planned contrasts suggested that the GAD only group was significantly higher than the control group (CI: [.37, 1.76], $p < .01, L = 1.07$), and the UDDs only group (CI: [.06, 2.03], $p < .05, L = 1.05$). However, the GAD group did not differ from the GAD + UDD group (CI: [−.53, 1.36], $p = .39, L = .42$). Additionally, the UDDs only group did not differ from the GAD + UDD group (CI: [−1.76, .50], $p = .27, L = −.63$) or from the control group (CI: [−.91, .95], $p = .97, L = .02$).

Sixth, we examined group differences on the one item measure of intolerance of uncertainty and found a main effect of diagnostic group ($F [3,138] = 29.34, p < .001, \eta^2 = .39$). Planned contrasts suggested that the GAD only group was significantly higher than the control group (CI: [2.41, 3.99], $p < .001, L = 3.20$) and the UDD group (CI: [.58, 2.63], $p < .01, L = 1.61$). However, it did not differ from the GAD + UDD group (CI: [−1.37, .67], $p = .50, L = −.35$). Additionally, the UDD only group was significantly lower than the GAD + UDD group (CI: [−3.12, −.79], $p < .01, L = −1.96$) and higher than the control group (CI: [.63, 2.56], $p < .01, L = 1.60$).

⁶ Unless otherwise noted, the Levene Test for homogeneity of variance was non-significant.

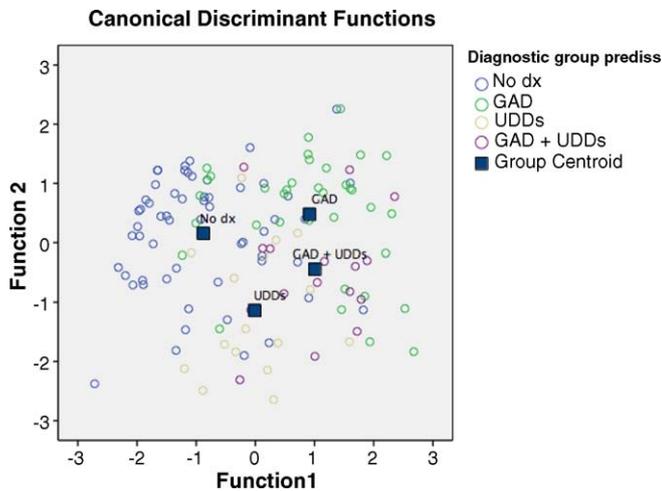


Fig. 1. Discriminant function analysis (Study 2).

We then conducted a multivariate analysis. Specifically, we ran a discriminant function analysis (DFA) to evaluate whether our one-item measures and symptom scales would differentially predict group membership. DFA identifies the linear combinations of variables (canonical discriminant functions) that maximize separation among groups (Duarte Silva & Stam, 1995). Two canonical discriminant functions significantly discriminated the four diagnostic groups (Wilk's $L = .45$, $\chi^2 [18, N = 128] = 98.80$, $p < .001$). The first canonical function demonstrated the strongest discrimination among diagnostic groups accounting for 72.8% of the variance (eigenvalue = .75, canonical $r = .66$) and had the highest absolute correlations with gastrointestinal symptoms composite score, emotion intensity, and intolerance of uncertainty. The second canonical function accounted for an additional 26.5% of the variance (eigenvalue = .27, canonical $r = .46$) and had the highest absolute correlations with positive affect and goal motivation. Additionally, a third non-significant canonical function (which accounted for an additional .7% of the variance, eigenvalue = .007, canonical $r = .09$) had the highest absolute correlations with muscle pains and aches composite score.

Fig. 1 demonstrates the relationship of the four diagnostic groups with these functions by plotting the unstandardized canonical discriminant functions for each group in a discriminant space. The second function is plotted against the first function. The first function (X axis; gastrointestinal symptoms, emotion intensity, and intolerance of uncertainty) best discriminated individuals with GAD and GAD + UDD from those with UDD only and controls, thus suggesting that it differentiated GAD from non-GAD regardless of UDD comorbidity. The second function (Y axis; positive affect, goal motivation) best discriminated individuals with GAD and controls from those with GAD + UDD and UDD only, thus suggesting that it differentiated GAD from UDDs.

4. Discussion

In the present investigation, we found that composite scores of physical symptoms (i.e., muscle pains and aches, gastrointestinal symptoms) and one-item measures of emotion, motivation, and cognitive processes differentiated GAD from UDDs at the symptom (Study 1) and diagnostic (Study 2) levels. In regression analyses conducted in the unselected undergraduate sample, composite scores of muscle pains and aches, gastrointestinal symptoms, and one-item measures of emotion intensity, and intolerance of uncertainty were associated with variance in GAD symptoms when controlling for UDDs symptoms, whereas positive affect was associated with variance in UDDs symptoms when controlling for

GAD symptoms. Similarly, in the diagnostic sample, these indices, as well as a one-item assessment of goal motivation, differed in the GAD and UDDs groups. Finally, discriminant function analyses showed that linear combinations of these subjective processes and physical symptoms discriminated individuals with GAD from those with UDDs.

A composite score of muscle tension consisting of headaches, neck aches, backaches, and sore jaws was associated with GAD symptoms when controlling for the presence of UDDs symptoms (Study 1) and was also higher in individuals with GAD only than in those with UDD only or no diagnosis (Study 2). These results are consistent with previous findings demonstrating muscle tension in GAD (e.g., Joormann & Stoeber, 1999; Kubarych et al., 2005), and suggest that the muscle tension criteria for GAD may need to be expanded to assess for more specific symptoms related to muscular aches and pains. Additionally, this more precise assessment of pains associated with tension might help shed light on the equivocal concordance between self-reports of muscle tension and the corresponding physiological activity (Pluess, Conrad, & Wilhelm, 2009). Lastly these findings suggests a potential cause for why individuals with GAD show an increase use of primary health care services (Roy-Byrne & Katon, 1997; Wittchen, 2002) as the problems associated with worrying may not reach a level of concern for some individuals until they experience them through bodily tension.

A composite score of gastrointestinal symptoms consisting of heartburn, ulcers, excessive gas, constipation, and other gastrointestinal problems was associated with variance in GAD symptoms after controlling for UDDs symptoms (Study 1). In Study 2, we found that individuals with GAD only experienced these gastrointestinal symptoms more frequently than individuals with no diagnosis. However, we found the difference between individuals with GAD only and UDDs only to be marginally significant, ($p = .07$; Cohen's $d = .56$, indicating a medium effect size; Cohen, 1988), suggesting that some caution should be taken in concluding that gastrointestinal symptoms are more strongly related to GAD. In this respect, more careful examination of gastrointestinal functioning should be conducted examining not only symptoms, but also normative functioning. For example, it might be important to examine appetite or eating patterns. Additionally, physiological assessment of gastrointestinal functioning might also indicate differences between GAD and UDDs. It is also feasible that the marginal significance of our findings be related to the relatively small sample size in Study 2. Overall, findings on gastrointestinal symptoms and muscle pains and aches provide preliminary evidence that these physical indices might provide a dimension with which to differentiate GAD from UDDs.

In regards to emotion, diminished positive affect was associated with UDDs symptoms when controlling for GAD symptoms (Study 1) and individuals with a diagnosis of GAD only had higher levels of dispositional positive affect compared to those with a diagnosis of UDDs and GAD + UDDs and on par with healthy controls (Study 2). These findings are consistent with structural models of affect suggesting that positive affect is diminished in unipolar depression and SAD when compared to the rest of the anxiety disorders (Brown et al., 1998; Watson et al., 2008). Similarly, emotion intensity was associated with GAD symptoms when controlling for depression (Study 1) and individuals with a diagnosis of only GAD symptoms endorsed higher emotion intensity than individuals with a diagnosis of only UDDs and healthy controls (Study 2). Together, these results speak to the importance of carefully examining valence and arousal when evaluating the relationships between mood and anxiety disorders.

Approach motivation also differentiated individuals with a diagnosis of GAD from those with a diagnosis of UDDs (Study 2). Specifically, individuals with only GAD had higher levels of goal

motivation (i.e., approach motivation) than those with only UDDs and similar levels to those endorsed by the healthy controls. However, in Study 1, goal motivation did not predict GAD symptoms or UDDs symptoms in any of the regression models. This finding suggests that the ability of goal motivation to differentiate between disorder categories in Study 2 might have been a function of clinical severity. This pattern of findings also underscores the need to simultaneously utilize both normative and clinical samples when studying psychopathology. Despite these equivocal results, further research clarifying the role of both approach and avoidance motivations and their relationship to negative and positive emotions in GAD and MDD is clearly warranted.

Intolerance of uncertainty was associated with GAD symptoms when controlling for UDDs symptoms (Study 1) and was higher in individuals with only GAD than those with only UDDs or healthy controls (Study 2). Additionally, individuals with comorbid GAD and UDDs diagnosis endorsed higher intolerance of uncertainty than those with only unipolar depression and did not differ from those with only GAD (Study 2), supporting the notion that intolerance of uncertainty could provide further diagnostic specificity to GAD compared to unipolar depressive disorders. These results are consistent with previous findings on intolerance of uncertainty (Dugas et al., 2004a, 2004b) and are noteworthy given that the only cognitive process that is part of the diagnostic criteria for GAD is excessive and uncontrollable worry (APA, 1994). Although the addition of worry helped solidify the diagnosis of GAD and increase its reliability, it might be partially responsible for the high overlap between GAD and UDDs, given its strong relationship with other repetitive thought processes, such as rumination (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002; Segerstrom, Tsao, Alden, & Craske, 2000; Watkins, 2008). In this respect, it might be necessary to broaden the cognitive criteria for GAD to include other processes that might capture core anxiety processes.

In a discriminant function analysis, we found that the aggregate of one-item subjective process and composite scores of physical symptoms discriminated GAD and unipolar depressive disorders through two distinct functions. These functions could possibly reflect the endophenotypes of anxious apprehension and anhedonia (Nitschke, Heller, Imig, McDonald, & Miller, 2001), which have been shown to have unique relationships to GAD and unipolar depressive disorders. The items that loaded on function 1 appear reflective of the preparedness associated with anxious apprehension. Specifically, intolerance of uncertainty is a cognitive process indicative of difficulties managing uncertainty associated with future events (see Dugas et al., 2004a, 2004b), emotion intensity is indicative of producing strong responses in response to the environment, and gastrointestinal symptoms in the context of mood and anxiety disorders might be associated with increase vigilance (Muth, Koch, Stern, & Thayer, 1999). Conversely, anhedonia is characterized by diminished responding to the environment. In this respect, the items loading onto function 2 appear reflective of this process. Specifically, reduced positive affect suggests that the positive reinforcement individuals get from interacting with the environment might not be present and diminished approach motivation indicates a lack of engagement with the environment. These results suggest that these physical symptoms and subjective processes might map onto the endophenotypes of anxious apprehension and anhedonia and that these endophenotypes might eventually provide a better source of nosological categorization. However, clearly, a great deal of further research is necessary to explore this possibility.

This investigation had a few notable limitations. First, the correlations between the one-item measures and the corresponding scales were small to moderate. Additionally, the correlations between positive affect and AIM positive affectivity ($r = .18$;

$p < .01$) and goal orientation and DERS Difficulties with Goals ($r = -.10$; $p < .01$) were small in magnitude. This suggests that, although related to the constructs of interest, the one-item measures of positive affect and goal orientation might be assessing a specific aspect of those constructs. Future work should focus on improving phrasing for the items and conducting more extensive piloting to find the items with the highest construct validity. Additionally, this issue relates to the larger question of whether one-item measures can reliably assess psychological processes. The answer to this question is likely going to vary depending on the degree to which the construct of interest is multi-faceted. For example, previous work has shown that one-item measures can reliably assess one-dimensional constructs (e.g., emotional arousal and valence, Russell, Weiss, & Mendelsohn, 1989; self-esteem, Robins, Hendin, & Trzesniewski, 2001). Additionally, somewhat more complex constructs are reliably assessed with one-item measures in our diagnostic manuals (e.g. depressed mood; fear of having future panic attacks). On the other hand, reliability theory suggests that it is important to use multiple items to assess a construct, so that the random errors associated with each individual item cancel each other out (e.g., Robins et al., 2001). Needless to say, this is a complex issue and future work should aim at identifying the degree to which one-item measures can provide reliable and practical assessment of psychological constructs.

Second, given the suggestions to diagnostically combine GAD with two forms of unipolar depression (i.e., MDD and dysthymic disorder; e.g., Watson et al., 2008), we examined the relationship between GAD and unipolar depressive disorders, at large. Future work should focus on teasing apart the relationship between GAD and both chronic and episodic forms of unipolar depression. Third, although muscle pains and aches differentiated GAD from UDDs at the univariate level, it is important to keep in mind that at the multivariate level, this variable did not load on the two functions that discriminated GAD from unipolar depressive disorder. In this respect, future work should explore the multivariate relationships between these associated symptoms and processes.

The findings from this investigation suggest that, despite the high comorbidity rates between GAD and UDDs, there are, in fact, a number of dimensions that can reliably distinguish these disorders and may be candidates for increasing diagnostic criteria specificity. Additionally, these results demonstrate that these dimensions can be assessed with one-item measures and a few physical symptoms, which could be readily incorporated into assessment protocols to continue to evaluate the relationship between these dimensions and GAD and UDDs. We hope that our findings spur research to further examine these dimensions in GAD, UDDs, and the rest of the mood and anxiety disorders. More immediately, we hope that these findings provide preliminary support for a cautious approach in attempts to combine GAD and UDDs.

References

- American Psychiatric Association. (1987). *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed.). Washington, DC: Author.
- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.). Washington, DC: Author.
- Barlow, D. H., & Wincze, J. (1998). DSM-IV and beyond: what is generalized anxiety disorder? *Acta Psychiatrica Scandinavica*, 393(Suppl.), 23–29.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX: Psychological Corporation.
- Beesdo, K., Hoyer, J., Jacobi, F., Low, N. C. P., Hofler, M., & Wittchen, H.-U. (2009). Association between generalized anxiety levels and pain in a community sample: evidence for diagnostic specificity. *Journal of Anxiety Disorders*, 23, 684–693.
- Belanger, L., Ladouceur, R., & Morin, C. M. (2005). Generalized anxiety disorder and health care use. *Canadian Family Physician*, 51, 1363–1369.
- Blanchard, E. B., Scharff, L., Schwartz, S. P., Suls, J. M., & Barlow, D. H. (1990). The role of anxiety and depression in the irritable bowel syndrome. *Behaviour Research and Therapy*, 28, 401–405.

- Brown, T. A., Chorpita, B. F., & Barlow, D. H. (1998). Structural relationships among dimensions of the DSM-IV anxiety and mood disorders and dimensions of negative affect, positive affect, and autonomic arousal. *Journal of Abnormal Psychology, 107*, 179–192.
- Brown, T. A., Di Nardo, P. A., Lehman, C. L., & Campbell, L. A. (2001). Reliability of DSM-IV anxiety and mood disorders: implications for the classification of emotional disorders. *Journal of Abnormal Psychology, 110*, 49–58.
- Brown, T. A., Marten, P. A., & Barlow, D. H. (1995). Discriminant validity of the symptoms constituting the DSM-III-R and DSM-IV associated symptom criterion of generalized anxiety disorder. *Journal of Anxiety Disorders, 9*, 317–328.
- Bryant, F. B., & Yarnold, P. R. (1996). Toward a measurement model of the affect intensity measure: a three-factor structure. *Journal of Research in Personality, 30*, 223–247.
- Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: psychometric properties of the English version. *Behaviour Research and Therapy, 40*, 931–945.
- Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*, 316–336.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Depue, R. A., Krauss, S. P., & Spont, M. R. (1987). A two-dimensional threshold model of seasonal bipolar affective disorder. In: D. Magnuson & A. Ohman (Eds.), *Psychopathology: an interactional perspective* (pp. 95–123). San Diego, CA: Academic Press.
- Di Nardo, P. A., Brown, T. A., & Barlow, D. H. (1994). *Anxiety Disorders Interview Schedule for DSM-IV*. Albany, NY: Graywind. pp. 585–594.
- Di Nardo, P. A., Moras, K., & Barlow, D. H. (1993). Reliability of DSM-III-R anxiety disorder categories. Using the Anxiety Disorders Interview Schedule. *Archives of General Psychiatry, 50*, 251–256.
- Drews, A., & Hazlett-Stevens, H. (2008). Relationships between irritable bowel syndrome, generalized anxiety disorder, and worry-related constructs. *International Journal of Clinical and Health Psychology, 8*, 429–436.
- Duarte Silva, A. P., & Stam, A. (1995). Discriminant analysis. In: L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding multivariate statistics* (pp. 277–318). Washington, DC: American Psychological Association.
- Dugas, M. J. (2000). Generalized anxiety disorder publications: so where do we stand? *Journal of Anxiety Disorders, 14*, 31–40.
- Dugas, M. J., Buhr, K., & Ladouceur, R. (2004). The role of intolerance of uncertainty in etiology and maintenance. In: R. G. Heimberg, C. L. Turk, & D. S. Mennin (Eds.), *Generalized anxiety disorder: advances in research and practice*. New York: Guilford Press.
- Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215–226.
- Dugas, M. J., Schwartz, A., & Francis, K. (2004). Intolerance of uncertainty, worry, and depression. *Cognitive Therapy and Research, 28*, 835–842.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (2002). *Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition With Psychotic Screen*. New York: Biometrics Research, New York State Psychiatric Institute.
- Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*, 791–802.
- Fresco, D. M., Frankel, A. N., Mennin, D. S., Turk, C. L., & Heimberg, R. G. (2002). Distinct and overlapping features of rumination and worry: the relationship of cognitive production to negative affective states. *Cognitive Therapy and Research, 26*, 179–188.
- Garakani, A., Win, T., Virk, S., Gupta, S., Kaplan, D., & Massand, P. S. (2003). Comorbidity of irritable bowel syndrome in psychiatric patients: a review. *American Journal of Therapeutics, 10*, 61–67.
- Germans, M. K., & Kring, A. M. (2000). Hedonic deficit in anhedonia: support for the role of approach motivation. *Personality and Individual Differences, 28*, 639–672.
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*, 41–54.
- Gros, D. F., Antony, M. M., McCabe, R. E., & Swinson, R. P. (2009). Frequency and severity of the symptoms of irritable bowel syndrome across the anxiety disorders and depression. *Journal of Anxiety Disorders, 23*, 290–296.
- Hazzlett-Stevens, H., Craske, M. G., Mayer, E. A., Chang, L., & Naliboff, B. D. (2003). Prevalence of irritable bowel syndrome among university students: the roles of worry, neuroticism, anxiety sensitivity, and visceral anxiety. *Journal of Psychosomatic Research, 55*, 501–505.
- Henriques, J. B., Glowacki, J. M., & Davidson, R. J. (1994). Reward fails to alter response bias in depression. *Journal of Abnormal Psychology, 103*, 460–466.
- Hettema, J. M. (2008). The nosologic relationship between generalized anxiety and major depression. *Depression and Anxiety, 24*, 300–316.
- Hoehn-Saric, R., & McLeod, D. R. (1988). The peripheral sympathetic nervous system: its role in normal and pathological anxiety. *Psychiatric Clinics of North America, 11*, 375–386.
- Hoehn-Saric, R., McLeod, D. R., & Zimmerli, W. D. (1989). Somatic manifestations in women with generalized anxiety disorder. Psychophysiological responses to psychological stress. *Archives of General Psychiatry, 46*, 1113–1119.
- Johnson, S. L., Turner, R. J., & Iwata, N. (2003). BIS/BAS levels and psychiatric disorder: an epidemiological study. *Journal of Psychopathology and Behavioral Assessment, 25*, 25–36.
- Joormann, J., & Stoeber, J. (1999). Somatic symptoms of generalized anxiety disorder from the DSM-IV: associations with pathological worry and depression symptoms in a nonclinical sample. *Journal of Anxiety Disorders, 13*, 491–503.
- Keefer, L., Sanders, K., Sykes, M. A., Blanchard, E. B., Lackner, J. M., & Krasner, S. (2005). Towards a better understanding of anxiety in irritable bowel syndrome: a preliminary look at worry and intolerance of uncertainty. *Journal of Cognitive Psychotherapy: An International Quarterly, 19*, 163–172.
- Kerns, C., Aldao, A., & Mennin, D. S. (2008). *An emotion regulation framework to discriminate generalized anxiety from depression: the role of emotion intensity and management*. Poster presented at the 42nd annual conference of the Association for Behavioral and Cognitive Therapies (ABCT), Orlando, FL.
- Kessler, R. C., Brandenburg, N., Lane, M., Roy-Byrne, P., Stang, P. D., Stein, D. J., et al. (2005). Rethinking the duration requirement for generalized anxiety disorder: evidence from the National Comorbidity Survey Replication. *Psychological Medicine, 35*, 1073–1082.
- Kessler, R. C., Chiu, W. T. M., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey. *Archives of General Psychiatry, 62*, 617–627.
- Kring, A. M., & Bachorowski, J. A. (1999). Emotions and psychopathology. *Cognition and Emotion, 13*, 575–599.
- Krueger, R. F. (1999). The structure of common mental disorders. *Archives of General Psychiatry, 56*, 921–926.
- Kubarych, T. S., Aggen, S. H., Hettema, J. M., Kendler, K. S., & Neale, M. C. (2005). Endorsement frequencies and factor structure of DSM-III-R and DSM-IV generalized anxiety disorder symptoms in women: implications for future research, classification, clinical practice, and comorbidity. *International Journal of Methods in Psychiatric Research, 14*, 69–81.
- Ladouceur, R., Dugas, M. J., Freeston, M. H., Rhéaume, J., Blais, F., Boisvert, J. M., et al. (1999). Specificity of generalized anxiety disorder symptoms and processes. *Behavior Therapy, 30*, 191–207.
- Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry. *Behavior Modification, 21*, 355–371.
- Larsen, R. I. (1984). Theory and measurement of affect intensity as an individual difference characteristic. *Dissertation Abstracts International, 85*, 2297B. University Microfilms No. 84-22112.
- Laugesen, N., Dugas, M. J., & Bukowski, W. M. (2003). Understanding adolescent worry: the application of a cognitive model. *Journal of Abnormal Child Psychology, 31*, 55–64.
- Mannuzza, S., Fyer, A. J., Martin, Y. L., Gallops, M. S., Endicott, J., Gorman, J., et al. (1989). Reliability of anxiety assessment: I. diagnostic agreement. *Archives of General Psychiatry, 46*, 1093–1101.
- Marten, P. A., Brown, T. A., Barlow, D. H., Borkovec, T. D., Shear, M. K., & Lydiard, R. B. (1993). Evaluation of the ratings comprising the associated symptom criterion of DSM-III-R generalized anxiety disorder. *Journal of Nervous and Mental Disease, 181*, 676–682.
- Masand, P. S., Kaplan, D. S., Gupta, S., & Bhandary, A. N. (1997). Irritable bowel syndrome and dysthymia: is there a relationship? *Psychosomatics, 38*, 63–69.
- Means-Christensen, A. J., Roy-Byrne, P. P., Sherbourne, C. D., Craske, M. G., & Stein, M. B. (2008). Relationships among pain, anxiety, and depression in primary care. *Depression and Anxiety, 25*, 593–600.
- Mennin, D. S., Heimberg, R. G., Fresco, D. M., & Ritter, M. R. (2008). Is generalized anxiety disorder an anxiety or mood disorder? Considering the multiple factors as we ponder the fate of GAD. *Depression and Anxiety, 25*, 289–299.
- Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2005). Preliminary evidence for an emotion regulation deficit model of generalized anxiety disorder. *Behaviour Research and Therapy, 43*, 1281–1310.
- Mennin, D. S., Holoway, R. M., Fresco, D. M., Moore, M. T., & Heimberg, R. G. (2007). Delineating components of emotion and its dysregulation in anxiety and mood psychopathology. *Behavior Therapy, 38*, 284–302.
- Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology, 49*, 377–412.
- Muth, E. R., Koch, K. L., Stern, R. M., & Thayer, J. F. (1999). Effect of autonomic nervous system manipulations on gastric myoelectrical activity and emotional responses in healthy human subjects. *Psychosomatic Medicine, 67*, 297–303.
- Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Przeworski, A., Erickson, T., et al. (2002). Preliminary reliability and validity of the Generalized Anxiety Disorder Questionnaire-IV: a revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33*, 215–233.
- Nitschke, J. B., Heller, W., Imig, J. C., McDonald, R. P., & Miller, G. A. (2001). Distinguishing dimensions of anxiety and depression. *Cognitive Therapy and Research, 25*, 1–32.
- Pluess, M., Conrad, A., & Wilhelm, F. H. (2009). Muscle tension in generalized anxiety disorder: a critical review of the literature. *Journal of Anxiety Disorders, 23*, 1–11.
- Robichaud, M., Dugas, M. J., & Conway, M. (2003). Gender differences in worry and associated cognitive-behavioral variables. *Journal of Anxiety Disorders, 17*, 501–516.
- Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin, 27*, 151–161.
- Rodebaugh, T. L., Holaway, R. M., & Heimberg, R. G. (2008). The factor structure and dimensional scoring of the generalized anxiety disorder questionnaire for DSM-IV. *Assessment, 15*, 343–350.
- Roemer, L., Lee, J. K., Salters-Pedneault, K., Erisman, S. M., Orsillo, S. M., & Mennin, D. S. (2009). Mindfulness and emotion regulation difficulties in generalized anxiety disorder: preliminary evidence for independent and overlapping contributions. *Behavior Therapy*.

- Roy-Byrne, P. P., & Katon, W. (1997). Generalized anxiety disorder in primary care: the precursor/modifier pathway to increased health care utilization. *Journal of Clinical Psychiatry*, *58*, 34–38.
- Russell, J. A., Weiss, A., & Mendelsohn, G. A. (1989). Affect grid: a single-item scale of pleasure and arousal. *Journal of Personality and Social Psychology*, *57*, 493–502.
- Segerstrom, S. C., Tsao, J. C., Alden, L. E., & Craske, M. G. (2000). Worry and rumination: repetitive thought as a concomitant and predictor of negative mood. *Cognitive Therapy and Research*, *24*, 671–688.
- Shankman, S. A., Klein, D. N., Tenke, C. E., & Bruder, G. E. (2007). Reward sensitivity in depression: a biobehavioral study. *Journal of Abnormal Psychology*, *116*, 95–104.
- Sloan, D. M., Bradley, M. M., Dimoulas, E., & Lang, P. J. (2002). Looking at facial expressions: dysphoria and facial EMG. *Biological Psychology*, *60*, 79–90.
- Sloan, D. M., Strauss, M. E., Quirk, S. W., & Sajatovic, M. (1997). Subjective and expressive emotional responses in depression. *Journal of Affective Disorders*, *46*, 135–141.
- Starcevic, V., & Bogojevic, G. (1999). The concept of generalized anxiety disorder: between the too narrow and too wide diagnostic criteria. *Psychopathology*, *32*, 5–11.
- Starcevic, V., Fallon, S., Uhlenhuth, E. H., & Pathak, D. (1994). Comorbidity rates do not support the distinction between panic disorder and generalized anxiety disorder. *Psychopathology*, *27*, 269–272.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn & Bacon.
- Vollbergh, W. A. M., Iedema, J., Bijl, R. V., de Graaf, R., Smit, F., & Ormel, J. (2001). The structure and stability of common mental disorders: The NEMESIS Study. *Archives of General Psychiatry*, *58*, 597–603.
- Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin*, *134*, 163–206.
- Watson, D. (2005). Rethinking the mood and anxiety disorders: a quantitative hierarchical model for DSM-V. *Journal of Abnormal Psychology*, *114*, 522–536.
- Watson, D., O'Hara, & Stuart, S. (2008). Hierarchical structures of affect and psychopathology and their implication for the classification of emotional disorders. *Depression and Anxiety*, *25*, 282–288.
- Weinfurt, K. P., Bryant, F. B., & Yarnold, P. R. (1994). The factor structure of the affect intensity measure: in search of a measurement model. *Journal of Research in Personality*, *28*, 314–331.
- Wittchen, H.-U. (2002). Generalized anxiety disorder: prevalence, burden, and cost to society. *Depression and Anxiety*, *16*, 162–171.