Mindfulness and emotion regulation difficulties in generalized anxiety disorder: Preliminary evidence for independent and overlapping contributions

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Abstract

Diminished levels of mindfulness (awareness and acceptance/nonjudgment) and difficulties in emotion regulation have both been proposed to play a role in symptoms of generalized anxiety disorder (GAD); the current studies investigated these relationships in a nonclinical and a clinical sample. In the first study, among a sample of 395 individuals at an urban commuter campus, we found that self reports of both emotion regulation difficulties and aspects of mindfulness accounted for unique variance in GAD symptom severity, above and beyond shared variance with depressive and anxious symptoms, as well as shared variance with one another. In the second study, we found that individuals diagnosed with clinically significant GAD ($n = 16$) reported significantly lower levels of mindfulness and significantly higher levels of difficulties in emotion regulation than individuals in a non-anxious control group ($n = 16$). Results are discussed in terms of directions for future research and potential implications for treatment development.

Keywords

mindfulness; worry; emotion regulation; acceptance; generalized anxiety disorder

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Generalized anxiety disorder (GAD; American Psychiatric Association, 1994) is a chronic anxiety disorder, centrally defined by pervasive, excessive worry. GAD is associated with high rates of comorbidity (e.g., Brown, Campbell, Lehman, Grisham, & Mancill, 2001), significant functional impairment (Kessler, Walters, & Wittchen, 2004), and significant health care costs/utilization (Greenberg et al., 1999). To date, cognitive behavioral treatments for this disorder have demonstrated efficacy; but a large proportion of individuals treated fail to meet criteria for high end state functioning (see Waters & Craske, 2005, for a review). An improved understanding of the psychological processes that underlie the symptoms of this chronic disorder, particularly those with direct treatment implications, may facilitate efforts to improve treatments by helping to refine targets for intervention. Recent theory and research has suggested that difficulties in emotion regulation and mindfulness, two phenomena explicitly linked to intervention strategies, may both play a role in GAD

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symptomatology; this study represents an initial investigation of their combined and independent effects, as well as their clinical relevance.

Several theories of GAD highlight the role that avoidant, negative responses to internal experiences seem to play in GAD (see Roemer & Orsillo, 2002, for a more extensive review). Research supporting Borkovec's avoidance theory of GAD (see Borkovec, Alcaine, & Behar, 2004, for a review) suggests that worry in GAD may serve an avoidant function: it may be negatively reinforced both by the nonoccurrence of low base-rate feared outcomes and by initial reductions in somatic arousal associated with worry (which maintain threatening associations over time). Mindfulness and emotion regulation deficits are two constructs that may be relevant to understanding avoidance in GAD. Whereas emotion regulation has received some empirical support (explained more fully below), the role of mindfulness in the context of GAD and emotion regulation has received little attention.

GAD and emotion regulation difficulties

Mennin, Heimberg, Turk and Fresco (2002), drawing on theories that highlight the functional nature of emotions, suggest that the motivation to avoid distressing internal experiences among individuals with GAD may stem from broad difficulties with emotion regulation. Drawing from other definitions of emotion regulation (e.g., Gross, 1998; Thompson, 1994), our definition includes the ability to monitor, understand and accept emotions, and to engage in goal directed behavior when emotionally activated (Gratz & Roemer, 2004). Mennin, Heimberg, Turk and Fresco (2005) posit that emotional intensity, poor understanding of emotions, negative reactivity to emotional states, and difficulty managing emotional states may prompt the use of worry as an emotional avoidance strategy, setting the stage for GAD. Worry may then further disrupt the functional use of emotional responses (by interrupting emotional processing, Borkovec et al., 2004; by distracting from the source of emotional arousal and thus reducing emotional clarity and disrupting the informational function of the response; and by paradoxically amplifying emotional intensity), creating a self-perpetuating cycle of emotional dysregulation and worry among individuals with GAD. Research has confirmed that individuals who endorse symptoms of GAD report greater negative emotional impulse strength, negative expressivity, and reactivity to their emotions (Mennin et al., 2005), less clarity about and more difficulty understanding their emotional responses (Mennin et al., 2005; Salters-Pedneault, Roemer, Tull, Rucker, & Mennin, 2006), more difficulty engaging in goals when distressed (Salters-Pedneault et al., 2006), and less ability to repair negative mood (Mennin et al., 2005) than controls.

Mindfulness and GAD

Another psychological phenomenon that may provide a context for understanding avoidance in GAD is mindfulness, a construct drawn from Buddhist traditions and defined for psychological research and integrated into psychological treatments in many different forms (see Baer, 2006, and Hayes, Follette, & Linehan, 2004, for book length reviews). Kabat-Zinn (1994) defines mindfulness as "paying attention, in a particular way: on purpose, in the present moment, nonjudgmentally" (p. 4). Bishop et al. (2004) proposed a two-component definition: self-regulation of attention toward immediate experience, with that attention characterized by openness, curiosity, and acceptance. This open, curious, accepting quality of attention has also been characterized as non-entangled or compassionate (Germer, 2005). Both of these aspects, attentional focus on the present moment and an attitude of openness, acceptance, and compassion toward this experience, may be relevant to our understanding and treatment of GAD.

Individuals with GAD characteristically focus their attention on potential future catastrophes, leading to a decreased awareness in the present-moment (Borkovec, 2002). Further, these individuals seem to judge, or evaluate their internal experiences – both their worry (Wells, 2004), and their emotional responses (Mennin et al., 2005; Roemer et al., 2005) – negatively, suggesting that low levels of both components of mindfulness may be associated with GAD. Reduced present-moment awareness and a judgmental stance towards one's internal experiences may interfere with individuals' adaptive learning in the present moment and amplify their emotional responses, thus perpetuating their avoidance. Hence, the relationships between aspects of mindfulness and GAD symptoms are likely bidirectional; worry may reduce present-moment awareness and acceptance/self-compassion, but these reductions likely perpetuate worry and other symptoms of GAD in turn, such that cultivating mindfulness may have beneficial effects on GAD symptomatology. These proposed relationships have yet to be studied empirically.

Mindfulness and emotion regulation

There are many apparent connections between mindfulness and emotion regulation difficulties. First, there is some overlap in their conceptual definitions – both include awareness (monitoring) and acceptance of emotional responses. However, awareness of/ attention to emotions as assessed in emotion regulation scales may not correspond to reduced clinical problems or increased well-being (e.g., Baker, Holloway, Thomas, Thomas, & Owens, 2004; Lieschetzke & Eid, 2003; Tull, Barrett, McMillan, & Roemer, 2007; Tull & Roemer, 2007), including reduced GAD symptoms (Salters-Pedneault et al., 2006), possibly because emotional awareness associated with critical judgment, lack of clarity, or difficulties regulating is in fact detrimental (e.g., Lieschetzke & Eid, 2003). This suggests that it may be the *quality* of emotional awareness that is clinically relevant, consistent with suggestions that a particular quality of awareness (accepting/compassionate) may be a clinically important aspect of mindfulness as well (Bishop et al., 2004). Hayes and Feldman (2004) describe the ways that mindfulness practice may enhance emotion regulation abilities, by decreasing both over-engagement (e.g., rumination and entanglement) and under-engagement (e.g., avoidance) with emotions and instead facilitating healthy, adaptive engagement that promotes clarity and functional use of emotional responses. Correlational research supports the proposed association between mindfulness and reduced emotion regulation difficulties (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Hayes & Feldman, 2004).

Thus, aspects of mindfulness and emotion regulation difficulties may account for shared variance in GAD symptom severity. However, it is also possible that these constructs have independent effects on GAD, given that potentially relevant aspects of each construct are conceptually distinct. For instance, many aspects of emotion regulation (such as understanding emotions and having access to strategies to effectively regulate emotion) thought to relate to GAD symptoms may be cultivated in ways that are unrelated to mindfulness processes, and difficulties in these domains may also relate to GAD symptoms (e.g., Mennin et al., 2005). Similarly, awareness of the present moment extends beyond awareness of one's emotions, and absence of this present-moment focus may interfere with adaptive learning and prolong anxious, avoidant responding in GAD (e.g., Borkovec, 2002).

In order to investigate the relationship of both emotion regulation difficulties and aspects of mindfulness with symptoms of GAD, we conducted two separate studies. First, in order to examine the independent and shared relationship of these phenomena with GAD symptom severity, we administered a series of questionnaires to a large sample of individuals at an urban university assessing these constructs (including assessments of each aspect of mindfulness, awareness and acceptance), as well as GAD symptom severity. We predicted significant zero order correlations among these variables. Then, we predicted that both

aspects of mindfulness and difficulties in emotion regulation would together predict GAD symptom severity above and beyond measures of depressive and anxious arousal symptoms, while each would also emerge as independent predictors of GAD symptoms. Second, to examine the clinical relevance of both phenomena, we assessed them in a clinical sample of individuals who received a principal diagnosis of GAD, and in a nonanxious comparison sample. We predicted that individuals with GAD would report significantly higher levels of difficulties with emotion regulation and significantly lower levels of both aspects of mindfulness than their nonanxious counterparts.

Study 1

Method

Participants—Four hundred and eleven individuals at an urban university commuter campus volunteered to complete a series of questionnaires. Sixteen participants were dropped from the sample due to missing data on one or more of the study variables, resulting in a sample of 395 individuals. The sample was 64.1% female and participants reported an average age of 23.2 (range 18 to 67). In terms of racial/ethnic identity, 13.2% of the sample identified as African-American/Black, 19.0% identified as Asian/Pacific Islander, 7.8% identified as Hispanic/Latino/a, 0.5% identified as Native American, 46.1% identified as White, 6.3% identified as multiracial, 6.4% listed another racial/ethnic identity and 0.7% did not respond to this item. In terms of current annual household income, 22.5% of participants reported it was under $15,000, while 23.5% reported it was between $15,000 and $30,000, 21.5% reported it was between $30,001 and $50,000, 29.1% reported it was above $50,001 and 3.4% did not respond to this item.

Self-report measures of emotion regulation and mindfulness—The *Difficulties in Emotion Regulation Scale (DERS;* Gratz & Roemer, 2004) is a 36-item self-report measure of difficulties with various dimensions of emotion regulation. The scale provides a total score, used in these studies as an indicator of broad difficulties in emotion regulation. Items assess lack of acceptance of emotions (e.g., "When I'm upset, I become embarrassed for feeling that way"), inability to engage in goal-directed behavior when distressed (e.g., "When I'm upset, I have difficulty getting things done"), impulse control difficulties (, e.g., "When I'm upset, I feel out of control"), limited access to strategies for effective regulation (e.g., "When I'm upset, I believe that there is nothing I can do to make myself feel better"), lack of awareness of emotions (e.g., "I pay attention to how I feel"), and lack of clarity of emotions (e.g., "I am confused about how I feel"). Participants indicate how often each item applies to themselves on a 5-point Likert-type scale, with 1 as *almost never* (0–10%) and 5 as *almost always* (91–100%). Higher scores indicate greater difficulties in emotion regulation. In a sample of undergraduate students at an urban university, the DERS demonstrated excellent internal consistency, good test-retest reliability, and adequate convergent validity with established measures of emotion dysregulation and emotional avoidance, and adequate predictive validity of self-reported behavioral outcomes associated with emotion dysregulation (i.e., self-harming behaviors and intimate partner abuse; Gratz & Roemer, 2004). In addition, the DERS was significantly negatively correlated with an experimental measure of emotion regulation within a clinical population (Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006). In the Study 1 sample, this measure demonstrated excellent internal consistency (Cronbach's α =.93).

The *Mindful Attention Awareness Scale (MAAS;* Brown & Ryan, 2000) is a 15-item self-report measure of present moment attention and awareness (i.e., the first aspect of the mindfulness definition used in the current studies). Items reflect inattention across several domains (e.g., cognitive, emotional, physical, general), such as "I find it difficult to stay focused on what's happening in the present" or "I rush through activities without being

really attentive to them." Participants are asked to endorse how frequently they have the experience described in each item on a 6-point Likert-type scale, with 6 indicating "almost never" and 1 indicating "almost always," so that high scores reflect higher levels of present moment attention. Studies have revealed a single factor model for the scale, along with good internal consistency and temporal stability (Brown & Ryan, 2000). The scale's incremental validity is demonstrated by correlations with psychological symptom and well-being scales, even after controlling for potentially related constructs like emotional intelligence and neuroticism. Validity is further demonstrated by findings that Zen practitioners score significantly higher on the MAAS than a comparison group and that, among individuals receiving a mindfulness intervention, increases in MAAS scores were significantly correlated with positive outcomes (Brown & Ryan, 2000). Its internal consistency in the Study 1 sample was excellent, $\alpha = .88$.

The *Self-Compassion Scale (SCS;* Neff, 2003) is a 26-item self-report measure that assesses a quality of relating to one's experience that is characterized as being kind to oneself rather than self-critical, seeing one's experiences as part of the human experience, and refraining from over-identifying with one's pain. Thus, this scale captures the accepting, open quality of awareness that constitutes the second aspect of mindfulness. Participants are asked to indicate how often they act in the manner described in each item on a 5-point Likert-type scale from 1 (almost never) to 5 (almost always). Sample items from the scale include "When times are really difficult, I tend to be tough on myself" and "I can be a bit cold-hearted towards myself when I'm experiencing suffering." Confirmatory factor analysis revealed evidence for a higher-order factor of self-compassion, suggesting that a total score can be used for the measure (although subscales also exist; Neff, 2003). Although initial studies calculated a total by adding up the mean scores of the subscales (e.g., Neff, 2003), the author now recommends using a mean score of the subscale scores as a total score (Neff, n.d.) so this method was followed. Internal consistency and test-retest reliability for the scale are excellent. Validity for the overall SCS is demonstrated by significant correlations with measures of related constructs and mental health outcomes, with the latter relationships remaining after controlling for shared variance in related constructs, such as self-esteem. Discriminant validity is demonstrated by an absence of correlations with measures of social desirability. Finally, Buddhist practitioners were found to score significantly higher on the measure than a comparison group, further supporting its construct validity (Neff, 2003). Itsinternal consistency in the Study 1 sample was excellent, $\alpha = .91$.

Symptom measures—The *Penn State Worry Questionnaire (PSWQ;* Meyer, Miller, Metzger, & Borkovec, 1990) is a widely used 16-item self-report measure assessing intensity and excessiveness of worry, the central defining feature of GAD. This measure has excellent psychometric properties (Molina & Borkovec, 1994) and clients with GAD scored significantly higher on the PSWQ than those with other anxiety disorders in a clinical sample (Brown, Antony, & Barlow, 1992). The measure was included here solely to establish validity of our GAD symptom severity measure, described below. Its internal consistency in this sample was excellent, $\alpha = .92$.

The *Depression, Anxiety, and Stress Scales – 21 item version (DASS-21;* Lovibond & Lovibond, 1995) is a 21-item version of the 42-item self-report measure of depressive, anxious arousal, and tension/stress symptoms, designed specifically to distinguish between these symptom clusters. There are 7 items each on the *depression* scale (e.g., "I couldn't seem to experience any positive emotion at all"), the *anxiety* (anxious arousal) scale (e.g., "I experienced trembling (e.g. in the hands)"), and the *stress* scale (e.g., "I found it hard to wind down"). The factor structure of the 21-item version has been supported in a clinical sample, with all three scales showing good to excellent internal consistency (Antony, Bieling, Cox, Enns, & Swinson, 1998). In this study, we used the *depression* and *anxious*

arousal subscales (αs = .88 and .82, respectively) to control for depressed mood and anxious arousal in our analysis of the specific relationships between emotion regulation, mindfulness, and GAD symptom severity. Clients with panic disorder have been found to score significantly higher on the *anxiety* (anxious arousal) scale than clients with other anxiety or mood disorders, while clients with major depressive disorder score significantly higher on the *depression* scale than clients with anxiety disorders (Antony et al., 1998), suggesting these two measures assess constructs that are more central to other disorders than GAD, although all clinical groups are elevated on these measures compared to controls. Using the 42-item version, individuals with GAD scored significantly higher on the *stress* subscale than those with panic disorder, social phobia, and specific phobia (Brown, Chorpita, Korotitsch, & Barlow, 1997), suggesting that the tension and stress symptoms in that scale are particularly central to GAD. This is consistent with findings that GAD is not characterized by autonomic arousal symptoms, like other anxiety disorders, but rather by symptoms of tension (Marten et al., 1993). Therefore, we controlled for variance due to *depression* and *anxiety* scales to rule out relationships due solely to shared associations with generalized symptoms/distress, taking a first step in examining the specificity of relationships between measures of mindfulness and difficulties in emotion regulation and symptoms of GAD.

Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002): The GAD-Q-IV assesses DSM-IV criteria for GAD in a self-report format. Questions address the presence of excessive and uncontrollable worry, including worry about minor things, more days than not over the past six months. Questions also address the number of worrisome topics, endorsement of GAD associated features, and severity of interference and distress related to worry and worry-related symptoms. The authors provide a formula to obtain a total score by combining responses on all items (ranging from 0 to 13), and suggest a cut-off score of 5.7 to indicate probable GAD diagnostic status (with preliminary validity evidence, Newman et al., 2002). Since our aim was to assess GAD symptom severity broadly, rather than determine diagnostic status, we altered the scale slightly. The instruction to skip out of the questionnaire if worry has not been experienced more days than not over the past six months was omitted, so that all participants would respond to all items on the measure, providing severity and interference ratings for all participants. We then used the dimensional score (following Newman et al.'s scoring) as an indicator of GAD symptom severity. This score was significantly correlated with the dimensional score using the cut-off, $r = .94$, and with the PSWQ, $r = .77$, providing preliminary evidence of its validity. Specific validity is demonstrated by the significant partial correlation of .62 between the PSWQ and the dimensional score, when variance due to depressive and anxious arousal symptoms (DASS-21) was partialled out.

Procedure—Participants were recruited at central locations on the campus of an urban commuter school. After reading and signing an informed consent form, they were given a packet of questionnaires and asked to complete it in one sitting, in a quiet place. They received $5 when they returned their completed questionnaires. A demographic form was included in the questionnaire packet, along with other measures not used in the current study.

Results

Raw mean scores and standard deviations for all main study variables are reported in Table 1. DASS – Depression and DASS – Anxiety scores were positively skewed, while the GAD-Q-IV dimensional score was negatively kurtotic. Square root transformations of the DASS – Depression, DASS – Anxiety, and GAD-Q-IV dimensional score all resulted in more normal distributions; these scores are used throughout (untransformed scores are reported in Table 1

for clarity). ANOVAs and correlations were conducted to determine whether gender, race/ethnicity, income, or age was significantly related to the GAD symptom severity score. Only a significant effect for gender emerged, GAD-Q-IV: $F(1,391) = 13.53$, $p < .001$, with women scoring higher on this scale. Therefore, the regression equation included gender in first step.

Zero order correlations among all variables are presented in Table 1 (a Bonferroni adjustment of $p < .003$ was used for multiple comparisons). As expected, GAD symptom severity (GAD-Q-IV) was significantly positively correlated with emotion regulation difficulties (as measured by the DERS) and significantly negatively correlated with both aspects of mindfulness – awareness (as measured by the MAAS) and non-judgment (as measured by the SCS). Reports of difficulties in emotion regulation (DERS) were also significantly negatively correlated with both the MAAS and the SCS, confirming the proposed overlap among these constructs. Interestingly, the correlation between the DERS and the SCS was especially high (−.68), suggesting that emotion regulation difficulties may be particularly associated with the acceptance component of mindfulness.[1]

Next, we were interested in examining shared and independent associations between aspects of mindfulness and difficulties in emotion regulation and GAD symptom severity, controlling for gender as well as anxious arousal and depressive symptoms. Therefore, we conducted a hierarchical regression predicting the GAD-Q-IV dimensional score. The DASS depression and anxiety subscales were entered in the first step, along with gender. MAAS, SCS, and DERS scores were entered in the next step. The overall model accounted for 47% of the variance and was significant, $F(6, 388) = 57.99$, $p < .001$. The second step significantly improved the model, even with depressive and anxious arousal symptoms accounted for, contributing an additional 7% of the variance. In the final step, all variables except DASS depression subscale remained significant independent predictors (see Table 2 for statistics for each variable at each step). That is, both aspects of mindfulness and difficulties in emotion regulation reliably explained unique variance in GAD symptom severity, beyond shared variance with one another and depressive and anxious arousal symptoms.

Finally, in order to determine whether aspects of mindfulness and difficulties in emotion regulation also explained shared variance in GAD, two additional regressions were conducted predicting GAD symptom severity. Again gender and both DASS subscales were entered in the first step. Then the DERS was entered in the second step of the first regression, followed by the MAAS and the SCS in the third step, while the order was reversed in the next regression (MAAS and SCS in the second step, DERS in the third). Of interest in these analyses were changes in partial correlations from the second to third steps, suggesting shared variance across constructs explained variance in GAD symptom severity. For the first regression, the partial correlation for the DERS decreased from .25 to .11 when aspects of mindfulness were added to the model. For the second regression, the partial correlation for MAAS dropped from −.21 to −.19, while the partial correlation for SCS dropped from −.19 to −.13, when the DERS was added to the model. These findings suggest that shared variance across constructs, in addition to independent aspects of each variable, explain variance in GAD symptom severity.

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[1]We conducted post-hoc correlations of the DERS subscales with the SCS – total score, to see if this correlation was due to overlap with the non-acceptance subscale of the DERS. In fact, the strongest correlation was with the limited access to strategies subscale of the DERS (−.65), while the correlation with the non-acceptance subscale was −.51.

Study 2

While Study 1 provides evidence that aspects of mindfulness and difficulties in emotion regulation are reliably and independently associated with GAD symptom severity in a sample drawn from an urban university, it does not speak to the clinical significance of these relationships. As an initial step in examining the clinical relevance of mindfulness to GAD, and replicating previous findings regarding difficulties in emotion regulation (Mennin et al., 2005), we examined these constructs in a clinical group and nonanxious comparison group.

Method

Participants—The sample for this study was drawn from a larger study comparing individuals with a principal diagnosis of GAD to non-anxious controls on a series of self-report measures (Lee, Orsillo, & Roemer, 2006). The clinical group in this study consisted of individuals seeking treatment at the Center for Anxiety and Related Disorders in Boston, Massachusetts for a principal diagnosis of GAD. Participants were assessed using the Anxiety Disorders Interview Schedule for DSM-IV – Lifetime Version (ADIS-IV-L, described more fully below; DiNardo, Brown, & Barlow, 1994). Inclusion criteria for the clinical group included (a) receiving a principal diagnosis of GAD (or either Major Depressive Disorder (MDD) or Dysthymia and GAD with GAD symptoms causing the most significant distress and interference); b) receiving a clinician determined ADIS severity rating of at least 4 (on an 8 point scale); (c) absence of current suicidal intent (those with suicidal ideation were eligible); (d) not meeting criteria for current bipolar disorder, substance dependence disorder, or psychotic disorder; (e) 18 or older; and (f) agreeing to participate in a study examining the efficacy of an acceptance-based behavioral therapy for GAD (Roemer, Orsillo, & Salters-Pedneault, in press).

The mindfulness measures in the present study were introduced after several waves of participants had already been enrolled; thus data are available for pre-treatment assessments from 16 of the clinical participants. This group was 68.8% female, with ages ranging from 20–66 ($M = 32.75$, $SD = 11.86$) and received a clinician-determined ADIS severity rating ranging from 5–7 ($M = 5.69$, $SD = .60$). Thirteen participants self-identified as White, one as Black, one as Asian, and one as Latino. Thirteen participants received a principal diagnosis of GAD, two received a principal diagnosis of GAD and MDD with GAD symptoms causing the most distress, and one received a diagnosis of co-occurring GAD and Dysthymia, with GAD symptoms causing the most distress. Ten participants received at least one additional diagnosis (including the co-principal diagnoses reported above). The most common additional diagnoses were social phobia ($n = 4$), MDD ($n = 3$, including the two noted above), and dysthymia ($n = 2$, including the one noted above). This is similar to comorbidities found in other studies of treatment-seeking individuals with GAD (e.g., Brown et al., 2001).

Participants without current anxiety or mood disorder were recruited from the Metropolitan Boston community through internet advertisements, email, and flyer postings for paid research participation to comprise the non-clinical sample. Sixteen participants who matched the clinical group on gender (68.8% female), age ($M = 31.38$, $SD = 9.06$), and self-reported racial identification (13 identified as White, 1 as Black, 1 as Asian, and 1 as multi-racial) make up the comparison group for this study. Initial screening for anxiety and mood disorder was completed by phone. A follow-up interview was conducted in-person using the Mini ADIS-IV, an abbreviated version of the ADIS-IV-L. Participants currently on medication, receiving psychological services, or meeting criteria for an anxiety or mood disorder in the past 12 months were excluded (with the exception of participants reporting a specific phobia).

Symptom measures—The *Anxiety Disorders Interview Schedule for DSM-IV* (ADIS-IV; DiNardo et al., 1994) comprehensively evaluates DSM-IV anxiety and mood disorders and elicits information necessary for crucial differential diagnoses (e.g., depression, mania, substance and alcohol use). In addition to providing diagnostic information on anxiety and mood disorders, the ADIS-IV includes a clinical severity rating (CSR) for each diagnosis received, ranging from 0 (none) to 8 (very severely disturbing/disabling). A CSR of 4 (definitely disturbing/disabling) or higher indicates meeting formal DSM-IV diagnostic criteria for a disorder. Interrater reliability of the GAD diagnostic category over a two week period has been demonstrated to yield a kappa coefficient of .67, indicating good agreement between raters (in a study conducted at the same site as the current study; Brown, DiNardo, Lehman, & Campbell, 2001). Participants in the clinical GAD group received this interview as part of their initial assessment (prior to enrollment in a treatment study). Participants in the nonanxious control group were administered an abbreviated version of this interview following the initial phone screen. The abbreviated version differs from the lifetime version in that assessment of past diagnoses (including information related to onset and remission) is omitted (Brown, DiNardo, & Barlow, 1994). This abbreviated version of the ADIS is often used when diagnostic history does not influence the decision for participant inclusion (e.g., Moscovitch & Hofmann, 2006). As described above, individuals in the clinical GAD group had to receive a principal diagnosis of GAD (or comorbid GAD and MDD or GAD and Dysthymia), with a clinician severity rating of at least 4. Individuals in the nonanxious group did not meet criteria for any anxiety and mood disorder (all CSRs were < 4).

The PSWQ and DASS-21 were included to provide descriptive data on the two groups and confirm differences in their symptoms. Internal consistencies were all excellent: αs= .96 (PSWQ), .89 (DASS-Depression), .93 (DASS-Anxiety), and .93 (DASS-Stress).

Self-report measures of emotion regulation and mindfulness—In order to assess difficulties in emotion regulation and the awareness and acceptance (self-compassion) components of mindfulness, the DERS, MAAS, and SCS were included in the initial assessment battery clients completed when they enrolled in the trial, and in the assessment battery that non-anxious controls completed when they completed the interview. Internal consistency for all scales was excellent: αs= .97 (DERS), .92 (MAAS), and .97 (SCS).

Results

To confirm symptomatic differences between the clinical and nonanxious group, a one-way multivariate analysis of variance (MANOVA) was performed comparing the groups on measures of depression, anxiety, stress and worry. Box's Test was significant ($p < .0005$), thus Pillai's Trace was used as a more conservative test to interpret the multivariate effect (Tabachnick & Fidell, 2007). There was a significant main effect of group on the combined dependent variables [$F(4, 27) = 27.07$, $p < .0005$, $\eta^2_p = .80$], with the clinical group reporting significantly higher levels of depression, anxiety, stress, and worry than the control group (see Table 3).

In order to test the hypothesis that participants with GAD would report lower levels of mindfulness and greater difficulties in emotion regulation, a second MANOVA was performed with the MAAS, SCS, and DERS as the dependent variables. Box's test for equality of variance-covariance was not significant, thus Wilk's was used to interpret the multivariate effect (Tabachnick & Fidell, 2007). There was a significant main effect of group on the combined dependent variables [Wilk's $\Lambda = .4$, $F(3, 28) = 13.98$, $p < .0005$], with a large effect, $\eta^2_p = .60$. As predicted, the clinical group reported lower levels of both aspects of mindfulness, and greater difficulties in emotion regulation compared to the non-clinical group (see Table 3).[2] Next, to examine how well the measures of mindfulness and

difficulties in emotion regulation could classify individuals with and without GAD, a logistic regression was performed. MAAS, SCS, and DERS were entered as predictor variables in a single step and group served as the dependent variable. Regression results indicated that the overall model was significant [χ^2(3, $N = 32$) = 26.68, $p < .0005$] and correctly classified 87.5% of cases. None of the variables emerged as significant independent predictors, suggesting that shared variance among the constructs explained this discrimination between groups.

Discussion

As predicted, findings from both studies revealed significant associations between both difficulties in emotion regulation and aspects of mindfulness (present-moment awareness and acceptance/self-compassion) and GAD symptom severity and diagnoses. Findings from Study 1 indicated dimensional associations between aspects of mindfulness and difficulties in emotion regulation and GAD symptom severity in an urban student sample. Reports of both difficulties in emotion regulation and aspects of mindfulness also demonstrated independent relationships with reports of GAD symptom severity, even when controlling for shared variance with the other, and depressive and anxious arousal symptoms. In examining the clinical relevance of these relationships in Study 2, individuals diagnosed with GAD reported significantly higher levels of difficulties in emotion regulation and significantly lower levels of mindfulness (both in terms of awareness and acceptance) than their non-anxious counterparts. While emotion regulation difficulties have been found among individuals with GAD individuals previously (e.g., Mennin et al., 2005), this is the first finding of reduced self-reports of mindfulness among individuals with GAD. These findings suggest that both constructs may play an important, independent role in GAD, with future research needed to clarify the nature and extent of these relationships.

Before discussing the implications of these findings, it is important to note the limitations of these studies. First, mindfulness and emotion regulation difficulties are both complex constructs that may not be fully captured by self-report instruments. Reduced emotional awareness might interfere with participants' ability to respond accurately to items on these measures. Further, responses indicate participants' perceptions of their emotion regulation difficulties and mindfulness skills and may not reflect actual difficulties. Nonetheless, the current findings provide evidence of the discriminant validity of the measures used, in that each accounted for unique variance in outcomes, suggesting responses do not reflect solely a generalized negative view of one's skills and abilities. However, future studies should employ other methods of assessment, particularly for emotion regulation difficulties (such as emotional recovery after exposure to a distressing stimulus) in order to more fully explore the nature of the difficulties being reported.

The assessment of mindfulness by self-report is a particularly new area of research. When the current studies were conducted, only a single dimension measure of mindfulness had been developed and validated (emphasizing present moment awareness, the MAAS), although researchers were asserting the importance of a second dimension – an accepting, compassionate quality of that awareness (Bishop et al., 2004). To capture that dimension, we used a measure of self-compassion that was derived in part from Buddhist concepts and

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[2]To further supplement this finding and to place it in context, a series of *t*-tests were conducted comparing both aspects of mindfulness and difficulties in emotion regulation in the clinical group with samples used in the original validation studies of the measures. (SCS scores in the original validation study were adjusted to mean rather than total scores for comparison.) As expected, the clinical group reported significantly lower levels of present moment awareness (MAAS) compared with college students [$M = 3.97$, $SD = .64$; $t(80) = -2.86$, $p < .01$, $\omega^2 = .08$], and lower levels of acceptance (i.e., self-compassion, SCS) compared with college students [$M = 3.04$, $SD = .63$; $t(421) = -5.86$, $p < .001$, $\omega^2 = .07$]. Both women ($M = 77.99$; $SD = 20.72$) and men ($M = 80.66$; $SD = 18.97$) in the clinical group also reported greater difficulties in emotion regulation compared with college students [$t(269) = 2.49$, $p < .05$, $\omega^2 = .02$ and $t(100) = 2.62$, $p < .05$, $\omega^2 = .05$, respectively].

whose operationalization closely reflects the accepting, compassionate quality of awareness associated with mindfulness (Neff, 2003). However, since these studies were conducted, researchers have developed and studied newer multi-dimensional measures of mindfulness (e.g., Baer, Smith, & Allen, 2004; Baer et al., 2006). These measures were specifically developed to assess mindfulness as a multi-faceted construct and may therefore capture it more fully and precisely than the two measures included in the current study. The self-compassion measure also demonstrated a significant, large correlation with the measure of difficulties in emotion regulation, which may reflect true shared variance between acceptance and emotion regulation skills (discussed more fully below), but may also reflect overlap in the operationalizations of these two constructs that limits our ability to detect unique variance associated with each. Given this overlap, it is noteworthy that each measure still showed unique associations with GAD symptoms.

The cross-sectional design of both studies precludes drawing conclusions regarding the causal relationships among these variables. As noted in the introduction, it is likely that both mindfulness and difficulties in emotion regulation have bidirectional relationships with GAD symptoms and perhaps also with each other. In addition, these designs prevent analyses of potential mediational effects, because we were unable to assess whether changes in one factor (such as mindfulness) preceded changes in another (such as emotion regulation skills), which preceded changes in GAD symptoms. Longitudinal, prospective, and experiencing sampling designs, as well as experimental studies, are needed to more fully determine the nature of these interrelationships. However, even if these difficulties are perpetuating, rather than etiological, factors in GAD symptoms, targeting them in treatment may be beneficial.

The small size of the sample in Study 2 limited our ability to examine the nature of the interrelationships among these variables more fully. Although this study provides preliminary evidence for the clinical relevance of both mindfulness and difficulties in emotion regulation to GAD, the absence of a clinical comparison group prevents us from being able to draw conclusions about the specificity of these relationships and the extreme groups comparison approach may have limited our ability to detect specific contributions of each construct. In addition, the size of the sample and the lack of racial diversity limit conclusions regarding the generalizability of findings. While Study 1 provided a more racially diverse sample, this was a non-treatment seeking sample and the clinical relevance of these findings remains to be determined. This study did provide preliminary evidence of unique associations among the variables of interest, beyond shared variance with symptom measures of anxious arousal and depression, although clinical comparisons will be needed to fully examine specificity. Further, it will be important to examine the potential moderating effects of demographic variables on the relationships examined here, as cultural factors may influence emotional responding in ways that affect these interrelationships.

Despite these limitations, findings provide important preliminary evidence of the potential relevance of both mindfulness and emotion regulation difficulties in GAD. Theoretical and empirical evidence has been accruing for the role of emotion regulation in psychological distress and psychopathology over the past several years (e.g., Rude & McCarthy, 2003; Mennin et al., 2005; Price, Monson, Callahan, & Rodriguez, 2006) and authors have recently proposed that emotion regulation may be a particularly useful frame for conceptualizing anxiety or emotional disorders (e.g., Campbell-Sills & Barlow, 2007; Mennin, 2005). These data support these claims, suggesting that in addition to a general association with anxiety and/or emotional disorders, these difficulties may have a reliable, specific relationship with GAD that warrants further study. It is important to note that the magnitude of the relationship between difficulties in emotion regulation and GAD symptoms, after controlling for depression and anxious arousal, is likely an underestimate,

given that the co-occurrence of depressive and anxious symptoms in GAD is part of the clinical presentation of the disorder and factors related to that are still worth targeting in treatment. As Miller and Chapman (2001) note in their seminal article, attempting to control for variance contributed by associated features of a clinical disorder may underestimate relationships (i.e., the remaining variance in GAD distinct from its association with depression and anxious arousal may not validly represent the full construct). Nonetheless, these findings suggest that a unique relationship between emotion regulation difficulties and GAD symptom severity is reliable and warrants further study.

Theoretical and empirical evidence has also been accruing for the role of mindfulness in psychological well-being (e.g., Baer et al., 2006; Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006), including proposals that mindfulness may be beneficial in the treatment of anxiety disorders (e.g., Bondolfi, 2005; Kabat-Zinn et al., 1992; Orsillo & Roemer, 2005). The present findings suggest that both present-moment awareness and an accepting/compassionate response to one's experience are uniquely related to GAD symptom severity, suggesting that mindfulness may be particularly relevant to the symptoms of GAD. Again, the magnitude of these relationship (particularly for the acceptance/ compassionate aspect of mindfulness) was small after controlling for depressive and anxious arousal symptoms and difficulties in emotion regulation, but this is likely an underestimate for the reasons described above. The finding that unique, reliable relationships among these overlapping variables exist suggests that each construct warrants further study in the context of GAD.

Given the present findings, one important avenue for future research is the examination of the ways in which poor emotion regulatory ability interacts with low mindfulness to affect individuals with GAD, and vice versa. A number of possible interrelations and interactions may be important. For instance, individuals who have more difficulty attending to their present moment experience of their emotions might be less able to effectively regulate and/ or might respond impulsively to their emotions, which may, in turn, increase worry cycles. Conversely, those individuals with GAD who have poor understanding of their emotions and have difficulty regulating these responses may become more critical and judgmental of their emotional responses and, subsequently, attend to them rigidly (as potential threats) without acceptance, prompting increased anxiety and worry. Clearly, emotion regulation and mindfulness difficulties may be important for GAD in a number of ways. However, experimental, prospective, and experience sampling designs, using clinical samples, will be needed to fully examine these hypotheses, and particularly to examine potential mediating relationships among these variables.

Although not the focus of the present study, findings also highlight relationships between difficulties in emotion regulation and aspects of mindfulness more generally, particularly the accepting/compassionate aspect of mindfulness. These relationships may be due in part to overlap in the operationalizations of constructs or method variance so future studies should examine these relationships using experimental methods and prospective designs. However, these findings provide preliminary support for Hayes and Feldman's (2004) suggestion that mindfulness may facilitate adaptive regulation of emotion, perhaps particularly through the cultivation of compassionate awareness. Conversely, effective regulation may also help to reduce judgment and criticism of one's internal experiences, thus enhancing this aspect of mindfulness.

Although the present findings are preliminary, they suggest potential targets for treatment. Clients with GAD may benefit from treatments that facilitate functional engagement with emotional experience (e.g., Mennin, 2006), as well as treatments that incorporate emotion regulation skills training (e.g., Linehan, 1993; Mennin, 2006). In addition, mindfulness skills

training (e.g., Linehan, 1993) and mindfulness-based therapies (e.g., Germer, Siegel, & Fulton, 2005) may target the low levels of present-moment awareness and acceptance associated with GAD symptoms. An acceptance-based behavioral therapy for GAD (Roemer & Orsillo, 2005), which incorporates mindfulness-based elements, attention to the functional nature of emotions, and elements of Acceptance and Commitment Therapy, including an emphasis on taking action in valued directions (Wilson & Murrell, 2004), has shown some initial promise in treating GAD in both an open trial and a small randomized controlled trial comparison to a waitlist control condition (Roemer & Orsillo, 2007; Roemer et al., 2008), although future research is needed to demonstrate its efficacy. Future studies will be needed to explore the efficacy of these approaches and their mechanisms of change, as well as the impact of mindfulness treatments on emotion regulation difficulties and emotion regulation treatments on mindfulness processes.

Acknowledgments

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Table 1

Raw score means and standard deviations of, and correlations among main study variables for Study 1.

Variables	Mean (SD)	1	2	3	4	5	6
1. GAD-Q-IV	6.00 (3.65)	---	.55**	−.48**	−.46**	.50**	.59**
2. DERS	82.12 (22.21)		---	−.48**	−.68**	.62**	.57**
3. MAAS	3.85 (.87)			---	.33**	−.44**	−.48**
4. SCS	3.09 (.68)				---	−.54**	−.39**
5. DASS-DEP	5.71 (5.05)					---	.59**
6. DASS-ANX	4.45 (4.35)						---

Note. GAD-Q-IV = Dimensional score from Generalized Anxiety Disorder Questionnaire –DSM-IV version; DERS = Difficulties in Emotion Regulation Scale – Total score; MAAS = Mindful Attention and Awareness Scale – Mean score; SCS = Self-Compassion Scale – Total mean score; DASS-DEP = Depression Anxiety and Stress Scales – Depression subscale; DASS-ANX = Depression Anxiety and Stress Scales – Anxiety subscale.

**
$p < .001$, Bonferroni adjustment of $p < .003$ used for multiple comparisons (.05/15)

Table 2

Regression equation predicting GAD-Q-IV dimensional scores, controlling for gender, depression and anxious arousal symptoms.

	$R^2\Delta$	Beta	Partial r	Semi-partial r
Step 1	.40[***]			
Gender		−.13[***]	−.17	−.13
DASS-DEP		.25[***]	.25	.20
DASS-ANX		.43[***]	.41	.35
Step 2	.01[*]			
Gender		−.14[***]	−.18	−.14
DASS-DEP		.08	.08	.06
DASS-ANX		.31[***]	.30	.23
MAAS		−.19[***]	−.22	−.16
SCS		−.13[*]	−.13	−.09
DERS		.13[*]	.11	.08

Note. GAD-Q-IV = Dimensional score from Generalized Anxiety Disorder Questionnaire –DSM-IV version; DASS-DEP – Depression Anxiety and Stress Scales – Depression subscale; DASS-ANX – Depression Anxiety and Stress Scales – Anxiety subscale; MAAS = Mindful Attention and Awareness Scale; SCS = Self-Compassion Scale – Total mean score; DERS = Difficulties in Emotion Regulation Scale – Total score.

[*]
$p < .05$;

[**]
$p < .01$;

[***]
$p < .001$

Table 3

Univariate results for independent MANOVAs for clinical and non-clinical samples on measures of depression, anxiety, stress, and worry and on measures of emotion regulation and aspects of mindfulness (awareness and self-compassion/acceptance).

Variables	GAD Sample n = 16 M	GAD Sample n = 16 SD	Non-GAD Sample n = 16 M	Non-GAD Sample n = 16 SD	$F(1, 30)$	$\eta^2 p$
MANOVA 1: Symptom Measures						
DASS-DEP	13.13	7.15	1.63	2.33	37.36***	.56
DASS-ANX	13.50	9.65	.38	1.09	29.24***	.49
DASS-STRESS	19.25	9.38	2.63	3.70	43.51***	.59
PSWQ	67.43	6.74	37.88	11.40	79.63***	.73
MANOVA 2: Emotion Regulation and Mindfulness						
MAAS	3.44	1.04	4.63	.67	14.91***	.33
SCS	2.36	.64	3.73	.68	34.40***	.53
DERS	96.88	21.49	55.37	13.82	42.22***	.58

Note. MANOVA 1: DASS-DEP = Depression Anxiety Stress Scales – Depression Subscale; DASS-ANX = Depression Anxiety Stress Scales – Anxiety Subscale; DASS-STRESS = Depression Anxiety Stress Scales – Stress Subscale; PSWQ = Penn State Worry Questionnaire. Bonferonni adjustment of $p < .013$ used for multiple analyses (.05/4). MANOVA 2: MAAS = Mindful Attention Awareness Scale – Mean score; SCS = Self-Compassion Scale – Total mean score; DERS = Difficulties in Emotion Regulation Scale – Total Score. Bonferonni adjustment of $p < .017$ used for multiple analyses (.05/3).

***
$p < .001$.