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## Delimiting the boundaries of generalized anxiety disorder: differentiating high worriers with and without GAD<sup>☆</sup>

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### Abstract

Investigations of the boundary between generalized anxiety disorder (GAD) and normal worry have relied primarily on comparisons of GAD-diagnosed individuals with non-anxious controls. One limitation of this approach has been its inability to determine whether characteristics associated with GAD are unique to the disorder or are typical of severe worry more generally. The present studies made this differentiation using a virtually unstudied population: severe worriers failing to meet the diagnostic criteria for GAD. These studies assessed the prevalence of non-GAD high worriers in several college samples and identified features distinguishing them from individuals with GAD. Non-GAD high worriers far outnumbered GAD high worriers and reported many of the same symptoms as their GAD-diagnosed counterparts. However, results revealed several characteristics that consistently distinguished the two groups. Implications for the conceptualization, assessment, and investigation of worry and GAD are discussed.

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## 1. Introduction

Since its metamorphosis from a residual diagnostic category into a principal Axis I disorder with its own defining characteristics in *DSM-III-R* (American Psychiatric Association, 1987), generalized anxiety disorder (GAD) has been a source of continued controversy. GAD was established as an anxiety disorder distinguishable from other disorders primarily by its cardinal feature: chronic, excessive worry (Borkovec, 1994; Craske, 1999). However, the preponderance of worry among other anxiety disorders and depression (Barlow, Blanchard, Vermilyea, Vermilyea, & DiNardo, 1986; Brown, Antony, & Barlow, 1992; Starcevic, 1995), the extensive comorbidity between GAD and these disorders (Brawman-Mintzer et al., 1993; Brown & Barlow, 1992), and the relatively poor diagnostic reliability of GAD itself (DiNardo, Moras, Barlow, Rapee, & Brown, 1993) have caused some to question the validity of this disorder (see Brown, 1997; Brown, Barlow, & Liebowitz, 1994 for reviews). These questions share a common concern about the boundaries that separate GAD from normal worry and from other comorbid conditions.

In response to these questions, a growing number of studies have attempted to explicate the boundary between GAD and normal worry (e.g., Craske, Rapee, Jackel, & Barlow, 1989; England & Dickerson, 1988; Eysenck, Mogg, May, Richards, & Matthews, 1990; MacLeod, Matthews, & Tata, 1986; Roemer, Molina, & Borkovec, 1997). As a group, these studies have relied almost exclusively on methodological designs comparing the worry experiences of GAD-diagnosed individuals with those of nonanxious controls, the latter carefully selected for their very low levels of worry and absence of anxiety symptoms. These studies have identified several potentially important characteristics that distinguish individuals with GAD from nonanxious participants, leading researchers such as Brown et al. (1994) to conclude that “the alterations in criteria for DSM-IV seem to have provided . . . a threshold between this diagnosis and the absence of mental disorder” (pp. 1278–1279). However, by virtue of their control samples, these studies provided only a very liberal test of the threshold between normal worry and GAD. By restricting their comparison to GAD and nonanxious extremes, the studies overlooked a group of individuals whose boundary with GAD may be far more tenuous than that of nonanxious controls—namely, severe worriers who do not meet the criteria of GAD.

A close examination of the worry and GAD literatures suggests that there may be an implicit assumption in these fields of inquiry about the existence of two types of worry: “normal worry,” which is mild, transient, generally limited in scope, and experienced by the majority of individuals; and “pathological worry,” which is excessive, chronic, pervasive, and experienced only by individuals with GAD. An important effect of this assumption is that pathological worry is often treated as though it were synonymous with a GAD diagnosis, and individuals reporting high levels of worry are generally presumed to have GAD (see Borkovec, Shadick, & Hopkins, 1991; Brown, 1997; Davey & Tallis, 1994).

Moreover, the reverse is also taken to be true: individuals who are not treatment-seeking and do not have GAD (i.e., “normal worriers”) are presumed not to experience pathological worry and are often assumed to have relatively low levels of worry in daily life. The problem with these assumptions is that the very qualities that designate worry as pathological—excessiveness, pervasiveness, and uncontrollability—may not be limited to GAD. Such worry may be evident not only in other diagnosed groups (e.g., Brown et al., 1992), but in nondiagnosed individuals as well. Although severe worry is the cardinal feature of GAD, the disorder is not diagnosed solely on the basis of worry quality. Several additional symptoms must also be present to warrant a diagnosis, including frequent incidence of three or more of motor tension, vigilance, or scanning symptoms; frequent experience of worry over a period of at least 6 months; and significant distress and/or functional impairment associated with worry and related symptoms of anxiety (American Psychiatric Association, 1994). Thus, although it has become customary to equate pathological worry with GAD, this convention may have had the unfortunate effect of obscuring a more complex relationship between GAD and its primary characteristic of severe worry.<sup>1</sup>

One significant consequence of this convention is that virtually all research investigating the nature of pathological worry has been conducted with GAD-diagnosed participants (see Borkovec et al., 1991). As a result, little to nothing is known about high worriers who fail to meet diagnostic criteria for GAD. The existence of individuals who experience worry with severe intensity and uncontrollability, yet who do not meet criteria for GAD, would challenge current formulations of normal and pathological worry and provide an important test of the relationship between worry and GAD. Such a test would help to determine whether worry characteristics ascribed to GAD in prior studies (e.g., excessiveness, uncontrollability) are unique to GAD or are typical of severe worry more generally. The existence of high worriers without GAD would also raise questions about the nature of this previously unstudied group, its prevalence in nonclinical samples, and its potential to benefit from clinical intervention. In particular, exploration of the ways in which severe worriers without GAD are distinguishable from those with GAD may enhance our understanding of the primary features that separate the disorder from normal experiences of worry and anxiety.

The present paper describes two studies examining worry experiences and GAD symptoms in several large college samples. These studies sought to determine what proportion of high worriers fail to meet *DSM-IV* diagnostic criteria for GAD and to identify features of these worriers that differentiate them from high worriers diagnosed with GAD. Although most college students are considered to be normal worriers (e.g., Tallis, Davey, & Capuzzo, 1994), college

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<sup>1</sup> To avoid any confusion that might be caused by using the phrase “pathological worry” in a more restrictive manner than is generally employed in the literature, the terms “severe” or “high” worry will be used instead throughout the paper to refer to worry that is excessive, pervasive, and uncontrollable but that may be experienced by individuals with or without GAD.

samples typically include the full range of worry severity scores on measures like the Penn State Worry Questionnaire (Meyer, Miller, Metzger, & Borkovec, 1990; Molina & Borkovec, 1994), suggesting that this population might be ideal for identifying and studying non-GAD high worriers. In addition, at least some of the symptoms of college students diagnosed with GAD are equally severe as those of GAD patients in clinical settings (Molina & Borkovec, 1994; Roemer, Borkovec, Posa, & Borkovec, 1995), suggesting that GAD-related findings of the present studies may have generalizability to GAD patients in clinical settings. Although it was hypothesized that a portion of individuals reporting severe levels of worry would not meet diagnostic criteria for GAD, it was not clear before empirical examination how large that proportion would be, nor how these worriers might differ from those diagnosed with GAD. Therefore, given the exploratory nature of this research, all analyses in the two studies were performed in both an original sample and a replication sample to ensure the reliability of the results.

## **2. Study 1**

### *2.1. Method*

#### *2.1.1. Participants*

Participants in the original sample were 1117 undergraduate students enrolled in Introductory Psychology at a large, northeastern university. Participants were primarily female (70%) and Caucasian (90%) and had a mean age of 18.58 years (S.D. = 1.89). Participants in the replication sample were 470 students enrolled in Introductory Psychology during a subsequent semester. As with the original sample, these participants were primarily female (73%) and Caucasian (87%), with a mean age of 19.13 years (S.D. = 2.10).

#### *2.1.2. Procedure and measures*

Participants in both samples completed three self-report measures as part of a larger departmental questionnaire battery early in the semester. Participation was voluntary and was rewarded with extra credit.

The first measure completed by participants was the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990), a 16-item, self-report measure of worry. The PSWQ was developed primarily out of clinical and research experiences with GAD clients and can thus be viewed as a measure that reflects severe worry. Items of the PSWQ are rated on a five-point Likert scale indicating how characteristic each item is of the respondent. Item responses are then summed to form a total score ranging from 16 to 80. The measure has been shown to have excellent psychometric properties in student, community, and clinical samples (cf. Molina & Borkovec, 1994; van Rijsoort, Emmelkamp, & Vervaeke, 1999). Prior research with college samples (see Molina & Borkovec, 1994) has found a PSWQ score of 56 to fall 1 S.D. below the mean of individuals diagnosed with GAD by the Anxiety Disorders

Interview Schedule-Revised (ADIS-R; DiNardo & Barlow, 1988). A score of 56 has also been found to optimally correspond to a diagnosis of GAD in Receiver Operating Characteristic (ROC) analysis, maximizing sensitivity and specificity while minimizing the difference between them (Mennin, Fresco, Heimberg, & Turk, 1999). Therefore, participants in the present study were regarded as “high worriers” if their PSWQ total score was greater than or equal to this value of 56.

The second measure included in the present study was the *DSM-IV* version of the GAD Questionnaire (GAD-Q-IV; Newman, Zuellig, Kachin, & Constantino, 1997), a nine-item diagnostic measure of GAD symptomatology. Preliminary research has supported the construct validity of this and earlier versions of the questionnaire (e.g., Newman et al., 1997; Roemer, Borkovec, Posa, & Lyonfields, 1991; Roemer et al., 1995) and has revealed a correspondence of 80% between *DSM-IV* GAD diagnoses made by the questionnaire and the ADIS-R in college student samples (Roemer et al., 1995). The dichotomous items of the GAD-Q-IV assess the presence/absence of symptoms comprising Criterion A (excessive worry, multiple worry topics, worry more days than not during the past 6 months), Criterion B (worry is uncontrollable), and Criterion C (at least three of six associated symptoms) of GAD. Symptoms of Criterion E (distress and functional impairment) are measured on nine-point Likert scales, and ratings of four (moderate) or higher on both scales are scored to indicate the presence of this criterion. In the present study, participants were assigned a diagnosis of GAD if they met all of the above criteria, as specified in *DSM-IV*. All other participants were assigned non-GAD status.

The final measure included in the present study was the Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979). Given the frequent co-occurrence of anxiety and depression in emotional disorders (Maser & Cloninger, 1990), it was thought that depression might prove to be a distinguishing factor between GAD-diagnosed and nondiagnosed high worriers. The BDI is a widely-used self-report measure of depression that has excellent psychometric properties in clinical and analogue samples and corresponds closely to clinical ratings of depressive symptomatology (Beck, Steer, & Garbin, 1988). Each of the 21 BDI items assesses the intensity of a specific symptom of depression on a scale of 0 to 3. BDI items sum to a total score ranging from 0 to 63.

## 2.2. Results

The relationship between worry and GAD was first explored in the original sample by examining the distribution of PSWQ total scores separately for all GAD ( $n = 70$ ) and non-GAD ( $n = 1036$ ) participants. As shown in the top panel of Fig. 1, the worry scores of participants diagnosed with GAD clearly fell at the upper end of the worry distribution. However, the distributions of the two groups overlapped extensively with one another, and a considerable number of non-GAD participants reported levels of worry greater than the mean of the GAD distribution ( $M = 67.20$ ,  $S.D. = 9.51$ ). The overlap of the two distributions was similarly pronounced in the replication sample, displayed in the bottom panel of Fig. 1.

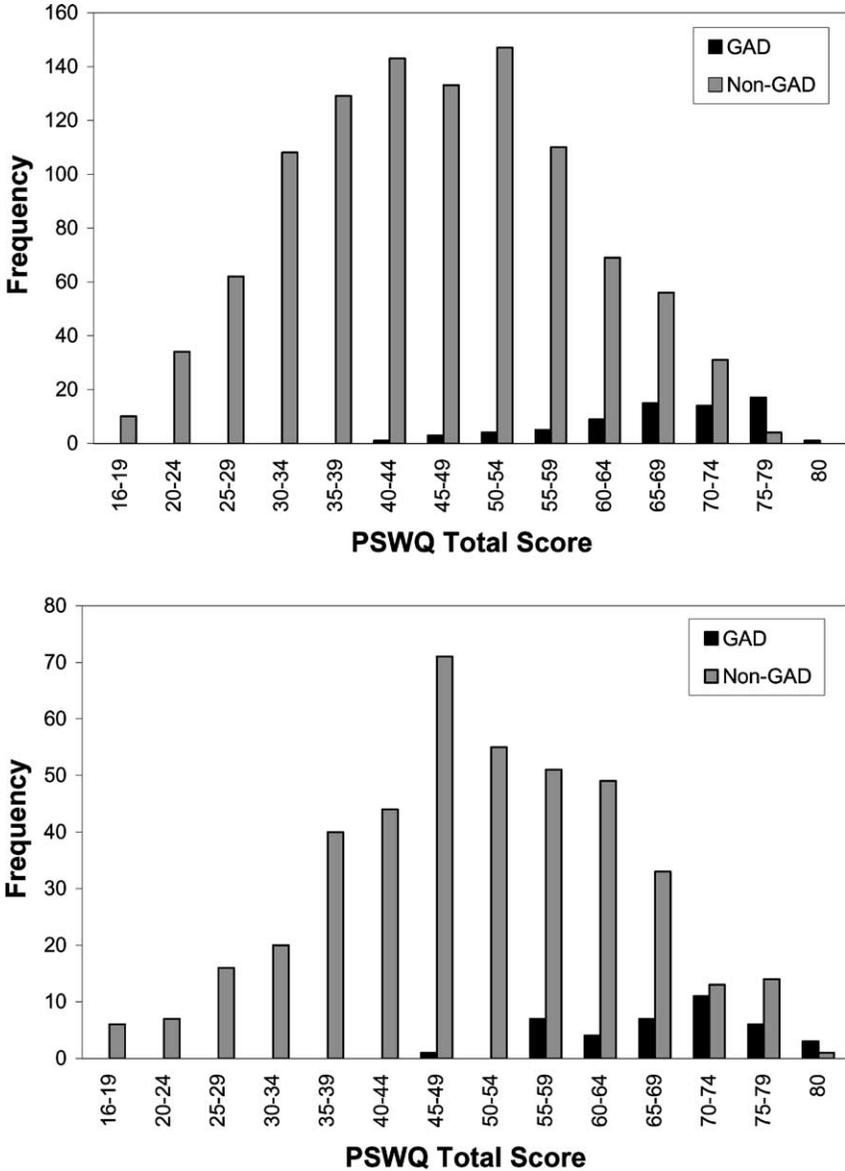


Fig. 1. Distributions of PSWQ total scores for participants with and without GAD in the original (top panel) and replication (bottom panel) samples of Study 1.

Inspection of the upper end of the PSWQ score distribution revealed substantial rates of severe worry in the original sample. Over a quarter of the sample (313 cases, or 28%) received a PSWQ score greater than or equal to 56. However, as noted before, a far smaller subset of the total sample (70 cases, or 6%) met *DSM-IV*

criteria for GAD. Within the replication sample, 40% of participants (186 cases) received a score greater than or equal to 56, whereas only 8% of participants (39 cases) met the criteria for GAD. Given the large number of nondiagnosed high worriers in both samples, it was important to determine whether these worriers met most of the criteria for GAD and barely missed the GAD diagnosis, or whether their experiences were sufficiently different from those of GAD high worriers to clearly distinguish the two groups. Inspection of criterion endorsement rates revealed that 78% of non-GAD high worriers in the original sample, and 68% of such worriers in the replication sample, met none or only one of the four major *DSM-IV* criteria for GAD, suggesting that the vast majority of these individuals did not even approach the diagnostic threshold for the disorder.

Having verified the existence of a large number of non-GAD high worriers in both samples, subsequent analyses were performed to determine how these individuals differed from those diagnosed with GAD. Descriptive statistics were first computed to identify the GAD diagnostic criteria that best differentiated the GAD and non-GAD high worriers. Table 1 presents endorsement rates for each of the GAD diagnostic criteria among non-GAD high worriers. Across both samples, non-GAD high worriers were most likely to meet Criterion B (worry is uncontrollable) and least likely to meet Criterion A (chronic, excessive worry) and Criterion E (symptoms cause significant distress or impairment), with endorsement of Criterion C (three or more associated symptoms) falling between these values. Closer inspection of the symptoms contained in Criterion A revealed that, whereas many non-GAD high worriers reported that their worry was excessive and concerned with multiple topics, relatively few reported that they worried more days than not during the past 6 months. Results from the 6 associated symptoms composing Criterion C revealed sizable differences in the proportion of

Table 1  
Percentages of non-GAD high worriers endorsing each GAD diagnostic criterion in Study 1 original and replication samples

Criterion	Sample	
	Original ( <i>n</i> = 254)	Replication ( <i>n</i> = 147)
Criterion A	10	12
Worry is excessive	51	48
Worry more days than not, past 6 months	27	29
Worry about multiple topics	92	95
Criterion B (worry is uncontrollable)	56	40
Criterion C (3 or more associated symptoms)	22	33
Criterion E (significant distress/impairment)	10	20
Worry causes distress	16	25
Worry causes impairment	13	29

In the two samples, 100% of GAD participants met each of the above criteria by diagnostic definition.

GAD high worriers (70–87%) and non-GAD high worriers (12–19%) who endorsed each of the symptoms in the original sample, all  $\chi^2(1, n = 323) > 85.00$ , all  $P$ 's  $< .001$ . In the replication sample, all associated symptoms except muscle tension were similarly endorsed by a greater proportion of GAD high worriers (85–92%) than non-GAD high worriers (28–33%), all  $\chi^2(1, n = 112) > 5.09$ , all  $P$ 's  $< .05$ . Endorsement rates of muscle tension by the two groups (59 and 24%) were not significantly different,  $\chi^2(1, n = 112) = .95$ , n.s.

A discriminant function analysis was next performed using the four major diagnostic criteria of GAD as independent variables. Because any analysis employing the same variables for group formation and for prediction would be expected to have a high overall accuracy rate, this analysis was conducted solely to assess the relative contribution of each GAD criterion to accurate differentiation of the two high worry groups. The discriminant function correctly classified 97% of high worriers in the original sample into GAD or non-GAD groups, with 10 of the 320 cases misclassified as false positives (that is, non-GAD cases misclassified as GAD). This function weighted Criterion A (.92) and Criterion E (.98) much more heavily than Criterion B (−.02) and Criterion C (−.50) when distinguishing members of the two groups.<sup>2</sup> An identical discriminant analysis performed on the replication sample correctly classified 98% of high worriers into GAD or non-GAD groups, with only 4 of the 183 cases misclassified as false positives. This discriminant function also weighted Criterion A (.81) and Criterion E (.59) more heavily than Criteria B (−.04) and Criteria C (.01) when differentiating members of the two groups, replicating the pattern of results uncovered in the original sample.

A series of  $t$ -tests was conducted on individual PSWQ items to further compare the worry experiences of individuals in the two groups. These analyses identified seven PSWQ items that significantly differentiated the two groups in the original sample; five of these items also yielded statistically significant differences in the replication sample (see Table 2). All seven items were related to the frequency and uncontrollability of worry experiences, with GAD high worriers reporting more frequent worry episodes and perceiving less control over their worrying than non-GAD high worriers. Considered alongside the relatively high endorsement of Criterion B (uncontrollability of worry) by non-GAD high worriers in earlier analyses, these results suggested that although non-GAD high worriers commonly regard their worry as uncontrollable, they perceive more control over their worry than do GAD high worriers.

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<sup>2</sup>The negative weight given to Criterion C by the discriminant function initially seemed counterintuitive, as this criterion is necessary for (and, thus, positively correlated with) a diagnosis of GAD. Additional discriminant function analyses were conducted to clarify this finding and are available from the author upon request. These analyses revealed that the contribution of Criterion C to the prediction equation was almost fully captured by Criteria A and E, leaving Criterion C unable to help discriminate between the worry groups. In fact, Criterion C was so redundant with Criteria A and E that it removed variance unrelated to GAD group membership from these variables, leading to its negative weight in the discriminant function.

Table 2  
Differences in the PSWQ item responses of GAD and non-GAD high worriers in Study 1

PSWQ item	Sample	
	Original	Replication
If I don't have enough time to do everything, I don't worry about it	0.71	0.19
My worries overwhelm me	-5.96**	-2.15*
I don't tend to worry about things	1.66	0.40
Many situations make me worry	-1.56	-0.89
I know I shouldn't worry about things, but I just can't help it	-0.54	-1.70
When I am under pressure I worry a lot	0.31	-1.47
I am always worrying about something	-5.56**	-3.20**
I find it easy to dismiss worrisome thoughts	-2.45*	-1.02
As soon as I finish one task, I start to worry about everything else I have to do	-2.77**	-1.78
I never worry about anything	1.65	0.63
When there is nothing more I can do about a concern, I don't worry about it any more	-0.22	-0.40
I've been a worrier all my life	-1.27	-1.60
I notice that I have been worrying about things	-3.07**	-2.72**
Once I start worrying, I can't stop	-5.64**	-3.53**
I worry all the time	-6.34**	-3.22**
I worry about projects until they are all done	-0.65	-1.58

All values in the table are *t*-values. For the original sample (70 GADs, 253 non-GAD high worriers), *df* = 321; for the replication sample (39 GADs, 147 non-GAD high worriers), *df* = 184.

\* *P* < .05.

\*\* *P* < .01.

Given the number of significant PSWQ item differences between groups, these results also suggested that the two groups differed in the overall severity of their worry experiences. An independent-samples *t*-test comparing the PSWQ scores of GAD high worriers (*M* = 67.20, *S.D.* = 9.51) and non-GAD high worriers (*M* = 62.87, *S.D.* = 5.35) in the original sample supported this conjecture, *t*(81) = -3.65, *P* < .001. This difference was replicated in the second sample, with GAD high worriers (*M* = 68.23, *S.D.* = 7.84) again reporting more severe levels of worry than non-GAD high worriers (*M* = 64.49, *S.D.* = 6.27), *t*(52) = -2.76, *P* < .01.

A *t*-test was performed on BDI total scores to determine whether GAD high worriers experienced higher rates of depressive symptoms than non-GAD high worriers. This analysis, performed in the original sample, revealed a statistically significant difference in depressive severity between GAD (*M* = 15.85, *S.D.* = 8.09) and non-GAD (*M* = 9.36, *S.D.* = 5.90) high worriers, *t*(87) = -6.18, *P* < .001. The same difference was found between the GAD (*M* = 13.19, *S.D.* = 7.47) and non-GAD (*M* = 8.02, *S.D.* = 5.43) high worriers in the replication sample, *t*(46) = -3.88, *P* < .001. To test whether the observed relationship between GAD and depressive symptoms was due solely to differences in PSWQ worry severity between the two groups, an analysis of covariance

(ANCOVA) was performed on the original sample of GAD and non-GAD high worriers. PSWQ scores were entered first into the analysis and accounted for 12% of the variance in BDI symptoms,  $F(1, 316) = 44.57, P < .001$ . Entered on the second step, GAD diagnosis explained an additional 8% of the variance in BDI scores,  $F(1, 315) = 34.02, P < .001$ . The interaction of these two variables, entered on the final step of the analysis, was not statistically significant,  $F(1, 314) = 1.30, n.s.$  This pattern of results was replicated in the second sample, with GAD diagnosis explaining 9% of the variance in BDI depressive symptoms,  $F(1, 161) = 17.36, P < .001$ , after controlling for PSWQ worry severity,  $F(1, 162) = 6.51, P < .05$ .

### 2.3. Discussion

The present study revealed that the vast majority of individuals experiencing high levels of worry do not meet full diagnostic criteria for GAD. Both informal inspection of criterion endorsement rates and more formal discriminant function analysis suggested that Criteria A (chronic, excessive worry) and Criteria E (significant distress or impairment) were the GAD criteria that best differentiated high worriers with and without the disorder. However, although Criterion B (uncontrollability) seemed considerably less useful in distinguishing the two groups, subsequent analysis of PSWQ items suggested that GAD and non-GAD high worriers did differ in the degree to which they regarded their worry as uncontrollable. Additional analyses revealed significant differences between the two groups in the severity of PSWQ worry and depression and suggested that GAD high worriers experienced more frequent worry than non-GAD high worriers. These findings—consistent across two large samples—suggest that GAD and worry are related but separate constructs, and that the GAD diagnosis is associated with greater emotional disturbance than is directly attributable to worry severity alone.

## 3. Study 2

Study 1 revealed differences in the relative ability of the GAD diagnostic criteria to differentiate high worriers with and without the disorder. At the same time, the dichotomous (present/absent) items of the GAD-Q-IV reflecting the phrasing used in *DSM-IV* left a number of questions unanswered. Dichotomous items provide limited information about the frequency and intensity of respondents' symptoms and, by forcing respondents to choose between two extremes, could actually lead to mistaken conclusions about the symptoms experienced by both groups. For example, although several symptoms of GAD were frequently endorsed by non-GAD high worriers, it was unclear whether these symptoms—when present in this group—were comparable in severity to those experienced by GAD high worriers. Similarly, it was unclear whether symptoms that were

infrequently endorsed by non-GAD high worriers went unendorsed because respondents simply did not experience them (i.e., an actual absence of symptoms), because respondents experienced these symptoms at subthreshold levels (i.e., symptoms coded as absent but actually experienced at some low level), or because respondents experienced these symptoms at threshold levels but did not consider them problematic enough to endorse (i.e., symptoms coded as absent but actually present at a clinically significant level). Different respondents are likely to have different thresholds for endorsing a symptom, and a dichotomous response scale relies on the implicit decision processes of individual respondents rather than on ratings of more explicit criteria that are standardized across respondents.

Given these limitations of data collected in Study 1, Study 2 added dimensional items to the GAD-Q-IV to assess the severity of GAD symptoms in new groups of participants and to further explore the relationship between worry and GAD. As in the previous study, all analyses were conducted in an original sample and a replication sample to ensure the reliability of results.

### *3.1. Method*

#### *3.1.1. Participants*

Participants in the original sample of Study 2 were 877 undergraduates enrolled in Introductory Psychology at the same university during a subsequent semester. The students were primarily female (68%) and Caucasian (89%) and had a mean age of 18.69 years (S.D. = 1.43). Participants in the replication sample were 325 additional Introductory Psychology students, also primarily female (64%) and Caucasian (88%), with a mean age of 19.13 years (S.D. = 2.33).

#### *3.1.2. Procedure and measures*

Participants in both samples completed the PSWQ and a revised version of the GAD-Q-IV<sup>3</sup> as part of a larger questionnaire battery early in the semester. Participation was voluntary and was rewarded with extra credit.

In the revised GAD-Q-IV, each of the dichotomous items of the original GAD-Q-IV was followed by a six-point Likert scale item assessing the severity with which that symptom is typically experienced (see Appendix A for a listing of the new items and their response scales). Participants were asked to respond to a dimensional item only if they first endorsed the presence of a symptom in its corresponding dichotomous item. The only exceptions to this format were made for the associated symptoms of GAD, which were rated by all participants directly on seven-point Likert scales assessing their frequency of occurrence, and for ratings of distress and impairment, which were made on nine-point Likert scales retained from the original GAD-Q-IV. Whereas the scales of the majority of dimensional items were anchored by descriptive labels referring to symptom

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<sup>3</sup>This revised version of the GAD-Q-IV is available from the author.

severity (e.g., difficulty of controlling worry was rated on a scale ranging from “minimally difficult” to “extremely difficult”), items assessing symptom frequency were rated on a more objectively anchored scale to provide more specific information about how regularly each of these symptoms was experienced by each group. This scale asked respondents to indicate how often they experienced worry and each associated symptom of GAD during the last 6 months using the following anchors:<sup>4</sup> (1) once every few months, (2) once or twice per month, (3) once per week, (4) two to three times per week, (5) four to five times per week, and (6) daily/almost every day. Endorsement of the latter two options objectively qualified for the *DSM-IV* criterion of the symptom being present “more days than not.” Consistent with Study 1, high worriers were identified by PSWQ scores greater than or equal to 56. GAD diagnostic status was determined by scoring the GAD-Q-IV dichotomous items according to *DSM-IV* criteria.

### 3.2. Results

Examination of the dimensional items in both the original and replication samples revealed considerable variability in the severity of symptoms endorsed by participants, with responses to all dimensional items spanning the full response scales. The result of *t*-tests in both samples revealed large, statistically significant differences between GAD and non-GAD high worriers on the dimensional severity ratings of every primary symptom of GAD indicated as “present” (see Tables 3 and 4). Among the high worriers in the original sample who perceived their worry to be excessive, those diagnosed with GAD rated their worry as significantly more excessive than did the 54% of non-GAD high worriers<sup>5</sup> who reported excessiveness,  $t(157) = -6.97, P < .001$ . GAD high worriers also perceived less control over their worrying than did the 66% of non-GAD high worriers who reported difficulty with controlling worry,  $t(174) = -5.73, P < .001$ . The same differences were found when group comparisons of worry excessiveness,  $t(47) = -3.73, P = .001$ , and uncontrollability,  $t(60) = -3.39, P = .001$ , were made in the replication sample. Thus, even among samples who reported the presence of excessive and uncontrollable worry, GAD high worriers rated their worry as more excessive and less controllable than non-GAD high worriers.

Of high worriers in the original sample who reported the presence of excessive and uncontrollable worry more days than not during the past 6 months, GAD high worriers reported experiencing such worry an average of approximately four to

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<sup>4</sup> Because the frequency of associated symptoms was rated by all participants, a response option of “never” (0) was added to the rating scale for those respondents who experienced no associated symptoms during the last 6 months. In contrast, the dimensional item assessing frequency of worry was rated only by participants who first indicated that they worried “more days than not” during the last 6 months, and thus did not require a “never” response option.

<sup>5</sup> As 100% of participants with GAD met full diagnostic criteria for the disorder, endorsement rates for the symptoms of GAD will only be reported for high worriers without GAD.

Table 3

Mean ratings of symptom severity by GAD and non-GAD high worriers who reported the presence of these symptoms: Study 2 original sample

Symptom	GAD ( <i>n</i> = 45)		Non-GAD ( <i>n</i> = 218)	
	<i>M</i>	S.D.	<i>M</i>	S.D.
Excessiveness of worry	4.71	1.12	3.32	1.13
Uncontrollability of worry	4.53	0.87	3.53	1.06
Frequency of worry in last 6 months	4.84	1.08	3.83	1.03
Frequency of worry about minor things	4.79	1.02	3.72	1.01
Global distress	5.71	1.38	3.05	1.54
Global impairment	5.53	1.14	2.95	1.58

All means differed significantly between the GAD/non-GAD groups at the  $P < .001$  level.

Table 4

Mean ratings of symptom severity by GAD and non-GAD high worriers who reported the presence of these symptoms: Study 2 replication sample

Symptom	GAD ( <i>n</i> = 20)		Non-GAD ( <i>n</i> = 73)	
	<i>M</i>	S.D.	<i>M</i>	S.D.
Excessiveness of worry	4.60	0.75	3.72	0.84
Uncontrollability of worry	4.50	1.19	3.52	0.99
Frequency of worry in last 6 months	4.60	0.88	3.65	1.40
Frequency of worry about minor things	4.86	0.86	3.43	0.92
Global distress	5.50	1.05	3.23	1.53
Global impairment	5.20	0.89	3.05	1.47

All means differed significantly between the GAD/non-GAD groups at the  $P < .01$  level.

five times per week, as compared with roughly two to three times per week for the 30% of non-GAD high worriers who endorsed the presence of this symptom,  $t(102) = -4.84$ ,  $P < .001$ . These means were comparable to those computed in the replication sample, which were also significantly different,  $t(41) = -2.61$ ,  $P < .05$ . Moreover, among the GAD and non-GAD high worriers who indicated the presence of excessive and uncontrollable worry about minor things,<sup>6</sup> GAD high worriers reported worrying about minor things more often than non-GAD high worriers, both in the original sample,  $t(177) = -5.81$ ,  $P < .001$ , and in the replication sample,  $t(56) = -5.10$ ,  $P < .001$ . These results suggest that, even among individuals who worry most frequently, those diagnosed with GAD

<sup>6</sup>Although worry about minor things is not a *DSM-IV* symptom of GAD, past research has suggested that this variable distinguishes between GAD-diagnosed and low-worry individuals (Roemer et al., 1997), leading to its inclusion in the original (and, thus, the revised) GAD-Q-IV. In Study 2, 84% of GAD high worriers and 68% of non-GAD high worriers in the original sample reported that they worried about minor things, whereas 70% of GAD and 64% of non-GAD high worriers in the replication sample endorsed this item.

experience more frequent worry in general and more frequent worry about minor things than those without GAD.

Interestingly, these findings also suggest that the manner in which diagnostic questions are asked—particularly questions related to the frequency of symptom occurrence—may lead to differential responding and, thus, to a different likelihood of diagnosis. Among participants in the original sample whose dichotomous response indicated the experience of worry “more days than not” in the last 6 months, 66% subsequently reported a specific worry frequency on the dimensional scale falling below the value necessary to actually experience worry “more days than not” (i.e., a scale score of 5, corresponding to worrying four to five times in an average week). This is reflected in the low mean ( $M = 3.54$ ) and modal (Mode = 4) responses to this item, which also fall below the “more days than not” cutoff. Similarly, in the replication sample, 72% of individuals who indicated that they experienced the presence of worry “more days than not” later reported a specific worry frequency falling below the cutoff associated with worrying “more days than not.” Although it is unclear which of the two scales yielded more accurate responses, these findings underscore the striking differences in item endorsement rates generated by the dichotomous versus continuous response scales.

Analyses comparing the frequency of associated symptoms reported by the two groups revealed that GAD high worriers were bothered more frequently by all six of these symptoms. Means computed across the average reported frequencies in Table 5 suggest that GAD high worriers in the original sample tended to experience these associated symptoms an average of approximately two to three times per week, whereas high worriers without GAD tended to experience them between one to two times per month and once per week. A similar pattern of results was uncovered in the replication sample (see Table 6). Two notable observations can be drawn from these data. First, although non-GAD high worriers experienced the six associated symptoms significantly less frequently than worriers with GAD, they still experienced these symptoms with some

Table 5  
Mean frequency ratings of associated symptoms reported by GAD and non-GAD high worriers: Study 2 original sample

Symptom	GAD ( $n = 45$ )		Non-GAD ( $n = 218$ )	
	<i>M</i>	S.D.	<i>M</i>	S.D.
Restless/keyed up/on edge	4.02	1.37	2.41	1.38
Sleep disturbance	3.58	1.62	2.30	1.60
Difficulty concentrating/mind going blank	4.42	1.47	2.64	1.48
Irritability	4.24	1.09	2.77	1.28
Easily fatigued	4.44	1.49	2.76	1.57
Muscle tension	4.38	1.63	2.44	1.73

All means differed significantly between the GAD/non-GAD groups at the  $P < .001$  level.

Table 6

Mean frequency ratings of associated symptoms reported by GAD and non-GAD high worriers: Study 2 replication sample

Symptom	GAD ( <i>n</i> = 20)		Non-GAD ( <i>n</i> = 73)	
	<i>M</i>	S.D.	<i>M</i>	S.D.
Restless/keyed up/on edge	4.15	1.23	2.71	1.44
Sleep disturbance	4.80	1.20	2.75	1.66
Difficulty concentrating/mind going blank	4.35	1.46	2.89	1.70
Irritability	4.60	1.10	2.93	1.26
Easily fatigued	4.60	1.43	3.01	1.65
Muscle tension	3.50	1.70	2.30	1.52

All means differed significantly between the GAD/non-GAD groups at the  $P < .01$  level.

regularity and intensity. For example, 84% of non-GAD high worriers in the original sample (73% in the replication sample) reported experiencing at least one associated symptom one or more times per week in the last 6 months. One-third of non-GAD high worriers (28% in the replication sample) experienced at least one of these symptoms four or more times per week during that period.

Second, similar to findings regarding participants' estimation of worry frequency, these results revealed inconsistencies in the reported frequency of associated symptoms during the last 6 months. According to the present study, 13% of all high worriers in the original sample (20% in the replication sample) experienced three or more associated symptoms "more days than not" (i.e., four or more times in an average week), meeting Criterion C for GAD. In contrast, in Study 1—wherein participants checked only "yes" or "no" to indicate whether they experienced each associated symptom more days than not—at least twice as many high worriers (39% in original sample, 47% in replication sample) met Criterion C. This marked contrast again suggests that estimates of symptom frequency are heavily influenced by whether such ratings are made on dichotomous or continuous scales.

Finally, the two high worry groups were compared on their global ratings of distress and impairment, rated by all participants directly on Likert scales. When asked how much distress they felt about their worry and the physical symptoms of anxiety associated with it, GAD high worriers reported a significantly higher level of distress than did non-GAD high worriers. This difference was statistically significant in both the original sample,  $t(255) = -10.70$ ,  $P < .001$ , and the replication sample,  $t(44) = -7.67$ ,  $P < .001$ . Similarly, GAD high worriers rated worry and its associated symptoms as a source of greater functional impairment than did high worriers without GAD, both in the original sample,  $t(84) = -12.80$ ,  $P < .001$ , and the replication sample,  $t(50) = -8.16$ ,  $P < .001$ . A Levene's test for Equality of Variances indicated that impairment ratings made by non-GAD high worriers were significantly more variable than those of GAD high worriers in both samples, indicating that high worriers without GAD evidenced greater

individual differences in their views about the impact of worry on their lives relative to the more consistently negative views of worry held by the GAD group.

As Study 1 revealed significant differences in worry severity between the GAD and non-GAD high worry groups,<sup>7</sup> it was important to determine whether the observed relationships between GAD and symptom severity could be explained purely by worry differences between the two groups. Thus, a series of ANCOVAs was performed within the total sample of high worriers, with each dimensional item serving as the dependent variable for one analysis. In each analysis, PSWQ total score was entered on the first step, and GAD diagnostic status was entered on the second step to assess its contribution to the prediction equation, over and above the variance explained by worry severity. Analyses conducted in the original sample revealed that GAD diagnostic status explained a significant proportion of variance over and above worry severity in each of the Likert scale items, all  $\Delta R^2$ 's  $> .05$ , all  $P$ 's  $< .001$ . This was the case even when PSWQ scores first captured large portions of the variance in symptom severity—up to 23%—through its prior entry into the regression equation. These results were paralleled in the replication sample, with GAD status accounting for a significant proportion of variance in each Likert scale item over that explained by worry severity, all  $\Delta R^2$ 's  $> .10$ , all  $P$ 's  $< .05$ .

### 3.3. Discussion

When non-GAD high worriers endorsed symptoms of GAD in the present study, they consistently rated these symptoms as less severe than did GAD high worriers. Individuals diagnosed with GAD reported more excessive, less controllable, and more frequent worry relative to non-GAD high worriers who endorsed these symptoms. GAD high worriers also experienced more frequent associated symptoms and reported greater distress and impairment than did non-GAD high worriers. However, ratings of associated symptoms, distress, and impairment—made on Likert scales by all participants—indicated that non-GAD high worriers still experienced these symptoms with significant frequency and intensity, suggesting that low endorsement of these symptoms in Study 1 likely reflected subthreshold, rather than absent, symptomatology. Results further suggested that individuals were more likely to endorse the presence of symptoms when merely asked the *DSM-IV* criterial question, “Did you experience this symptom more days than not for the past 6 months?” than when they were asked to estimate the actual frequency of a symptom. These findings were consistent across two large samples, enhancing confidence in the reliability of the results.

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<sup>7</sup> Comparison of the PSWQ item responses of GAD and non-GAD high worriers in Study 2 revealed significant differences on the same seven PSWQ items that differentiated the groups in Study 1. A table summarizing these results has been omitted to conserve space and is available from the author on request.

#### 4. General discussion

The present studies represent the first investigations into a long-overlooked group of individuals who hold great promise for enhancing current knowledge about the boundaries of GAD. These studies revealed that the majority of individuals experiencing high levels of worry do not meet the diagnostic criteria for GAD. They also indicated that although non-GAD high worriers commonly reported many of the symptoms of GAD, they differed from GAD high worriers in several important ways. Study 1 revealed that non-GAD high worriers worried less frequently than GAD high worriers and were less likely to view their worry as a source of significant distress or impairment. Whereas many non-GAD high worriers regarded their worry as uncontrollable, results suggested that this group still perceived greater control over worrying than their GAD-diagnosed counterparts. These suggestions were supported and extended in Study 2, which revealed that non-GAD high worriers experienced all of the symptoms of GAD with significantly less severity than did GAD high worriers. However, results also indicated that non-GAD high worriers experienced many of these symptoms with considerable frequency and intensity. Taken together, these results suggest that GAD is distinguishable from high levels of worry and that the diagnosis of GAD has at least some utility over and above its primary feature of severe worry.

These findings may have considerable implications for the ways in which GAD and worry are viewed by mental health professionals and for the manner in which they are studied. The present studies emphasize that GAD is more than just high levels of worry and that GAD symptoms unrelated to the excessiveness or uncontrollability of worry—such as those pertaining to the frequency of worry and the distress or impairment with which worry is associated—may be very important delimiting factors of this disorder. At the same time, these studies suggest that many of the symptoms previously thought to distinguish GAD from normal worry—for example, experiencing uncontrollable worry or worrying about minor things—may be characteristic of high levels of worry rather than GAD *per se*. What appears to distinguish high worriers with and without GAD is rather the degree or severity with which they experience the symptoms of the disorder. These findings suggest that the boundary between GAD and normal worry may be more a matter of degree than a matter of qualitative differences between truly different emotional experiences. Recent research using statistical procedures designed to evaluate the nature of boundaries between constructs (taxometric procedures; see Meehl, 1995; Meehl & Golden, 1982) has suggested that normal and pathological worry lie along a single continuum uninterrupted by a qualitative boundary (Ruscio, Borkovec, & Ruscio, 2001). Although the present studies hint that the boundary between normal worry and GAD may be similarly quantitative, they also indicate that GAD is not synonymous with severe worry and that characteristics of one may not necessarily generalize to the other. Therefore, research is needed to assess the latent structure of GAD itself via

taxometric procedures to further explicate its boundary with normal experiences of worry.

The present findings have additional, potentially important consequences for the conceptualization of worry. Although the phrase “normal worry” is typically used to denote the worry experiences of all individuals other than those diagnosed with GAD, much of what is currently known about normal worry comes from research with nonanxious individuals deliberately selected for their very low worry levels. By sampling from the top rather than the bottom of the distribution of worry scores, the present studies revealed that normal worry is characterized by greater variability and complexity than is typically described in the extant worry literature. This sampling approach identified a large group of worriers that has been virtually ignored by worry researchers but that provides a unique and important means for learning about the nature of worry, both as it is commonly experienced and as it relates to pathological states. This group of high worriers may help us to address some of the most fundamental issues debated within the mental health professions, including the question of what constitutes mental health and mental illness, and why individuals experiencing similar symptoms react to these symptoms in normal versus pathological ways. At present, we know almost nothing about high worriers without GAD, including whether the significant worry that they experience could benefit from clinical intervention. Research is clearly needed to explore the experiences of this group of worriers and to specify further ways in which they resemble and differ from worriers with GAD.

One highly promising area of future research with GAD and non-GAD high worriers relates to the ways in which these groups appraise and interpret their worry experiences. In the present studies, one of the largest and most consistent differences between the groups was that GAD high worriers tended to regard their worry as significantly more problematic (i.e., distressing and impairing) than did non-GAD high worriers. At present, it is unclear to what extent this finding can be attributed to actual differences in the worry experienced by the two groups (e.g., GAD worriers experience worry more frequently and, therefore, view it as more problematic) versus the extent to which it reflects differences in attitudes about worry that may lead to different interpretations of similar worry experiences. Recent work by Wells (Wells, 1995; Wells & Carter, 1999) suggests that the tendency to “worry about worry” may be an important discriminating feature of GAD. Research is needed to determine whether the negative metacognitive appraisal of worry is unique to GAD or is associated more generally with high worry, as well as to assess whether meta-worry is a cause or a consequence of GAD. Future research might also examine what leads high worriers to perceive their worry as either problematic or benign. Such studies, aimed directly at the point of demarcation between normal and abnormal experiences of worry, may significantly contribute both to debates about GAD and to the broader debate about the critical juncture between normality and psychopathology.

The present studies raised another issue with broad implications for the assessment of psychopathology. Their results revealed that, when participants were asked to estimate how often they experience the symptoms of GAD, they responded with very different frequency estimates depending on the response scale with which they were provided. More specifically, when asked whether their symptoms were present “more days than not in the last 6 months” as required by *DSM-IV*, participants were far more likely to respond positively to this question when asked to give a dichotomous (yes/no) response than when reporting the actual frequency of their symptoms. It appears that this response tendency led many high worriers to be diagnosed with GAD who might not otherwise have met *DSM-IV* criteria for the disorder. Given that virtually all standardized measures used to diagnose patients in clinical and research settings (e.g., ADIS-R; Structured Clinical Interview for DSM-IV, First, Spitzer, Gibbon, & Williams, 1996) ask respondents to estimate the frequency of their symptoms using the first of these approaches, and given that symptom frequency and duration are integral criteria of most psychiatric disorders, this finding has implications for assessment practices that extend beyond the specific content of the present studies. Although the lower endorsement rates yielded by the more objective, specific response scale were suspected to be more accurate than those yielded by the dichotomous options, the actual accuracy of both approaches remains an empirical question. Research is needed to determine which method of reporting yields more accurate information about symptom frequency. However, before such research can be used to improve diagnostic practice, it will first be necessary to clarify whether the *DSM* frequency criterion is actually intended to reflect the objective frequency of a symptom, or whether it is instead designed to reflect the subjective experience of a symptom as persistent and pervasive. Clearly, these disparate goals have very different implications for the assessment and conceptualization of psychopathology.

The results of the present research raise several specific recommendations for the investigation of worry and GAD. First, these findings suggest that research designs comparing GAD high worriers with nonanxious, low-worry controls may not only fail to identify those characteristics which are unique to GAD versus those which are more broadly associated with high levels of worry, but may actually lead to inaccurate assumptions about the nature of normal worry experiences. Future research concerned with the process of normal worry would usefully ensure that the full range of normal worry experiences are sampled and represented in order to maximize the comprehensiveness and generalizability of results. Second, the finding that worry and GAD are related but distinguishable constructs suggests that future investigations must carefully select participants to ensure that study samples adequately represent the construct of interest. Thus, it may not be appropriate to use measures of severe worry such as the PSWQ to diagnose GAD (cf. Mennin et al., 1999), and attempts to use such instruments in a diagnostic fashion with any but the most extreme of cutoff scores will likely yield heterogeneous samples with an unacceptably high rate of false-positive cases. Likewise, restricting samples of severe worriers to those diagnosed with GAD is

likely to exclude the majority of highly worried individuals, thereby reducing the generalizability of results and limiting our understanding of the nature and experience of severe worry. The present findings, therefore, suggest that investigations of worry and GAD must be clearly differentiated with respect to sampling, measurement, and generalization of results.

The present investigations were conducted with college undergraduates, and the discovery of high rates of nondiagnosable, severe worry in this population—one often considered to be particularly well-adjusted—not only documents the existence of non-GAD high worriers but also hints at their likely prevalence in other populations. However, it is unclear to what extent findings concerning the prevalence, symptoms, and experiences of non-GAD high worriers can be generalized to individuals outside the college student population. The specific characteristics of these high worriers must, therefore, be assessed in community samples to determine their generalizability. A second limitation of the present studies is that, given the size of the samples used, assessment of GAD was restricted to self-report questionnaires. Given the close correspondence between GAD diagnoses by the GAD-Q and the ADIS-R (Roemer et al., 1995), the GAD-Q-IV was regarded as an appropriate measure for these studies. However, in order to further increase confidence in the validity of the present findings, particularly with respect to issues of diagnostic boundaries, these findings should be replicated and extended in samples diagnosed by structured clinical interviews.

Finally, it may be argued that the PSWQ cut score of 56 used to identify high worriers in the present studies was too low to appropriately represent severe worry, especially given the sizable rate of high worry yielded by this cut score in presumably well-adjusted college samples. Because previously reviewed studies found a score of 56 to fall within 1 S.D. of the GAD group mean and to optimally correspond to a diagnosis of GAD in ROC analysis, this score was viewed as the most defensible demarcator of high worry on the PSWQ. Although other cut points may have also been appropriate, past research supports the use of the PSWQ score of 56 as a sensitive and specific designator of severe worry in college samples.

The present studies provided a conservative test of the hypothesis that GAD is distinguishable from severe worry. It is argued that these results have significant implications for the conceptualization, assessment, and investigation of worry and GAD, and that findings suggest several promising new avenues of research to further explore the boundaries of the GAD diagnosis.

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## Appendix A. Dimensional items added to the GAD-Q-IV in Study 2

If you answered yes to #2 (skip if answered no), to what extent is your worry excessive?

Minimally excessive	Mildly	Moderately	Quite a bit	Very much	Extremely excessive
1	2	3	4	5	6

If you answered yes to #4 (skip if answered no), how difficult is it to control or stop your worrying?

Minimally difficult	Mildly	Moderately	Quite a bit	Very much	Extremely difficult
1	2	3	4	5	6

If you answered yes to #6 (skip if answered no), how often do you worry excessively and uncontrollably about these *minor things*?

Very rarely	Rarely	Sometimes	Often	Very often	Almost always
1	2	3	4	5	6

If you answered yes to #9 (skip if answered no), how often have you been bothered by excessive and uncontrollable worries during this 6-month period?

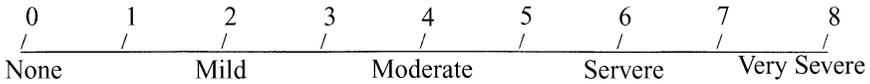
Once every few months	Once or twice per month	Once per week	Two to three times per week	Four to five times per week	Daily/ almost every day
1	2	3	4	5	6

During the last 6 months, how frequently have you been bothered by each of the following symptoms?

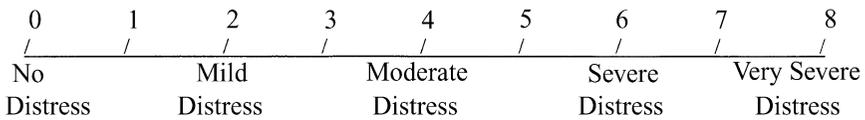
Never	Once every few months	Once or twice per month	Once per week	Two to three times per week	Four to five times per week	Daily/ almost every day
0	1	2	3	4	5	6

- Restlessness or feeling keyed up or on edge.
- Difficulty falling/staying asleep or restless/unsatisfying sleep.
- Difficulty concentrating or mind going blank.
- Irritability.
- Being easily fatigued.
- Muscle tension.

How much do worry and these physical symptoms interfere with your life, work, social activities, family, etc.? Choose *one number*:



How much are you bothered by worry and these physical symptoms (how much distress do they cause you)? Choose *one number*:



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