Somatic Symptoms of Generalized Anxiety Disorder from the DSM-IV: Associations with

Pathological Worry and Depression Symptoms in a Nonclinical Sample

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Abstract

The present study investigates the specificity of the six somatic symptoms that are associated with generalized anxiety disorder (GAD) according to DSM-IV. A nonclinical sample of 183 students provided severity ratings for (1) restlessness, (2) easily fatigued, (3) difficulty concentrating, (4) irritability, (5) muscle tension, and (6) sleep disturbance. In addition, they responded to questionnaires assessing pathological worry and depression symptoms. Partial correlations and multiple regression analyses indicated that only muscle tension showed a unique relation to pathological worry. In contrast, difficulty concentrating was exclusively related to depression symptoms. The present findings corroborate psychophysiological findings that elevated muscle tension is a specific characteristic of pathological worriers. Moreover, they suggest that the problem of unclear boundaries between GAD and major depression may be reduced if future revisions of the somatic symptom list for GAD emphasize muscle tension while de-emphasizing difficulty concentrating.

Introduction

When generalized anxiety disorder (GAD) was introduced into the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1980), it was a residual category lacking specific symptom markers. It therefore came as no surprise that the diagnostic reliability of GAD was low (Barlow & DiNardo, 1991; Rapee, 1991). This changed with the next revision, the DSM-III-R (American Psychiatric Association, 1987) when GAD was established as an independent nosological category. Cardinal criterion for a diagnosis of GAD became pathological worry, defined as excessive and/or unrealistic worry about two or more life circumstances for a period of at least six months. In addition, DSM-III-R established the so-called "6 out of 18 criterion": From a list of eighteen somatic symptoms forming three clusters (autonomic hyperactivity, motor tension, and vigilance/scanning), at least six symptoms had to be present for a diagnosis of GAD.

Despite these specifications, GAD was still one of the disorders with the lowest diagnostic agreement (Barlow & DiNardo, 1991; DiNardo, Moras, Barlow, Rapee, & Brown, 1993). Moreover, GAD showed unclear boundaries with normal worry, with other anxiety disorders, and with mood disorders. Particularly comorbidity with major depression was high, with estimates ranging from 11% to 46% (Brown, Barlow, & Liebowitz, 1994). A number of studies suggested that the eighteen somatic symptoms contributed to the poor discriminant validity of this DSM-III-R category. Mannuza et al. (1989), for example, reported that over 50% of the cases of interrater disagreement regarding the presence of GAD were attributable to variance in the report of somatic symptoms.

Especially the nine somatic symptoms comprising the autonomic hyperactivity (AH) cluster were criticized in their role as defining characteristics of GAD. The reason was that psychophysiological studies found only few differences between GAD clients and nonanxious controls with respect to AH indicators such as elevated skin conductance, respiration rate, heart rate, or blood pressure (Hoehn-Saric & Masek, 1981; Hoehn-Saric, McLeod, & Zimmerli, 1989) even though these indicators are seen as hallmark features of anxiety. Other studies found that GAD clients had lower levels of arousal than panic clients and no higher levels of activation at rest than nonanxious controls (Borkovec & Lyonfields, 1993; Rapee, 1991). On the contrary, GAD seemed to be related to an inhibition of sympathetic systems (Borkovec & Hu, 1990). This was supported by studies showing that GAD clients responded

to psychological stress with autonomic inflexibility. Confronted with psychological challenges, GAD clients showed decreased variability in autonomic responses relative to nonanxious controls (Hoehn-Saric & McLeod,1988; Lyonfields, Borkovec, & Thayer, 1995). Also interview data indicated that GAD was characterized by symptoms that show stronger relations to central nervous system activity than to autonomic nervous system activity (Marten, Brown, Barlow, Borkovec, Shear, & Lydiard, 1993).

　　　　Combined, these results suggested that GAD displays a unique pattern of somatic symptoms that is different from other anxiety disorders. Thus, the DSM-III-R list of associated somatic symptoms of GAD was in need of revision. A large multi-site study with 204 GAD clients (Marten et al., 1993) provided the empirical basis for such a revision. It revealed that only seven of the DSM-III-R somatic symptoms showed high endorsement rates with good interrater reliability. All seven symptoms were from the two clusters, motor tension and vigilance/scanning. In contrast, most of the symptoms with low endorsement rates were from the AH cluster. Largely based on these findings, the list of symptom markers for GAD was revised in the next edition of the DSM, the DSM-IV (American Psychiatric Association, 1994). All symptoms from the AH cluster were eliminated. After combining some of the other symptoms, only six somatic symptoms remained, namely (1) restlessness or feeling keyed up or on edge, (2) easily fatigued, (3) difficulty concentrating or mind going blank, (4) irritability, (5) muscle tension, and (6) sleep disturbance. Moreover, a "3 out of 6 criterion" was established: From the six symptoms listed, at least three had to be present for a diagnosis of GAD.

　　　　Following the revision, a number of studies was conducted to investigate the new, reduced criterion list of somatic symptoms for GAD. Abel and Borkovec (1995) conducted diagnostic interviews with GAD clients and nonanxious controls to compare DSM-III-R and DSM-IV criteria. They found that the DSM-IV somatic symptoms showed the highest endorsement rates among clients, thus discriminating the group of GAD clients from the control group. Freeston, Dugas, Letarte, Rhéaume, Blais, and Ladouceur (1996) examined the endorsement rates of DSM-III-R and DSM-IV somatic symptoms in nonclinical participants who met cognitive criteria for GAD in self-reports. They found that all DSM-IV somatic symptoms showed high endorsement rates and distinguished worriers from nonworriers. Brown, Marten, and Barlow (1995) compared the validity and classification accuracy of the DSM-III-R and DSM-IV associated symptom criteria in a large sample of clients with anxiety or mood disorders. Endorsement of the DSM-IV somatic symptoms correlated more strongly with clinical severity ratings of GAD and with self-reported pathological worry than did endorsement of the AH symptoms from the DSM-III-R list. Examining the average intensity and frequency scores for DSM-III-R and DSM-IV clusters of somatic symptoms in a sample of clients with GAD, with other anxiety disorders, and with mood disorders, Brown et al. found that DSM-IV scores of GAD clients were significantly higher than scores of clients with other anxiety disorders. Moreover, over 98% of clients with a principal DSM-III-R diagnosis of GAD met the DSM-IV associated symptom criterion ("3 out of 6"). Overall, the results supported the utility of the revised criteria.

　　　　However, some problems remained. In the study by Brown et al. (1995), clients with GAD did not differ from clients with major depression/dysthymia with respect to the average intensity and frequency scores for the DSM-IV clusters. The only significant differences between the GAD group and the depression group were found for scores related to the DSM-III-R cluster of autonomic hyperactivity. Moreover, while over 98% of the GAD clients met the DSM-IV "3 out of 6 criterion," a large percentage of clients with other disorders met this criterion as well. Thus, while demonstrating high sensitivity, the criterion showed only low

specificity, particularly with respect to depression: Over 90% of clients with depression also met the associated symptom criterion for GAD. Whereas the DSM-IV criterion list enhanced discriminant validity with respect to panic disorder, Brown et al. found that discriminant validity with respect to depression was mitigated. Similar results were found in a nonclinical sample (Freeston et al., 1996). On the one hand, the associated somatic symptoms retained in the DSM-IV were factorially separate from a panic-like factor and formed a brief scale that did not overlap with other scales that measure anxiety symptoms. On the other hand, depression symptoms (as measured with the Beck Depression Inventory) showed higher correlations with the associated somatic symptoms retained in the DSM-IV than with those eliminated. However, when the brief scale of the retained symptoms was correlated with pathological worry (as measured with the Penn State Worry Questionnaire), the resulting correlation was higher than the one with depression symptoms.

Whereas the latter finding indicates that the total list of the DSM-IV somatic symptoms for GAD may discriminate between pathological worry and depressive symptomatology, it is unclear to what extent this is also the case for the individual symptoms. However, if one could show that not all of the six somatic symptoms are equally useful in discriminating pathological worry and depression symptoms, this would be relevant for questions concerning the discriminant validity of the DSM-IV category "GAD" as well as for a better understanding of differences between pathological worry and depression. Therefore, the aim of the present study was to extend the findings of Freeston et al. (1996) by evaluating the six associated somatic symptoms of DSM-IV GAD with respect to their individual relationships with pathological worry and depression symptoms in a nonclinical sample.

Method

Participants

A sample of 183 students (138 female) was recruited at the Free University Berlin. The average age of the participants was 25.7 years (SD = 5.7). Participants received a comprehensive battery of questionnaires assessing characteristics of anxiety, depression, and GAD-associated somatic symptoms. All students volunteered for participation, in exchange for two hours of extra course credit.

Measures

Penn State Worry Questionnaire (PSWQ). To assess pathological worry, we included the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990; German translation by Stöber, 1995). The PSWQ is a 16-item measure that covers excessiveness, uncontrollability, and associated distress of pathological worry as experienced by clients diagnosed with GAD (e.g., "Once I start worrying, I can't stop" or "My worries overwhelm me"). The PSWQ has demonstrated high internal consistency, high test-retest reliability, and substantial validity (Molina & Borkovec, 1994; Stöber, 1998). In the present sample, the PSWQ had a mean of 43.60 (SD = 8.74). Internal consistency was .84 (Cronbach's alpha).

Beck Depression Inventory (BDI). To assess depression symptoms, we included the 13-item short form of the Beck Depression Inventory (BDI) (Beck & Beck, 1972; German translation by Kammer, 1983). The short form was developed as a fast screening test for depression. It addresses all principal depression symptoms and has demonstrated sound psychometric properties (cf. Beck, Steer, & Garbin, 1988). Moreover, the short form has shown correlations with the long form of .95 and .96 (Kammer, 1983; Beck & Beck, 1972,

respectively). In the present sample, the BDI had a mean of 4.17 (SD = 4.14). Internal consistency was .81 (Cronbach's alpha). Inspecting the distribution of BDI scores, we found substantial positive skewness. Consequently, BDI scores (X+1) were subjected to a logarithmic transformation (Tabachnik & Fidell, 1989, p. 86) to meet the normality requirement of our statistical analyses.

Generalized Anxiety Disorder Questionnaire (GADQ). To assess the DSM-IV somatic symptoms for GAD, we included an adaptation of the Generalized Anxiety Disorder Questionnaire (GADQ; Roemer, Borkovec, Posa, & Borkovec, 1995; own translation). The original GADQ is a self-report measure of GAD symptoms as defined by DSM-III-R. For the present study, the GADQ was adapted to meet DSM-IV criteria (American Psychiatric Association, 1994). Specifically, we substituted the list of eighteen DSM-III-R somatic symptoms with the list of six DSM-IV somatic symptoms. Moreover, we replaced the yes-no answer format for the somatic symptoms with Likert-style rating scales. Following the German translation of the Anxiety Disorders Interview Schedule-Revised (Margraf, Schneider, Ehlers, DiNardo, & Barlow, 1991), the severity of each somatic symptom during the last six month was rated on a five-point scale from Not at all (0) to Very severe (4). Presentation of GADQ results will be restricted to these ratings.

Results

Replicating the findings of Freeston et al. (1996), the ratings of the six somatic symptoms showed high intercorrelations (cf. Appendix) and formed a homogenous scale with an internal consistency of .76 (Cronbach's alpha). Moreover, the total score of this scale showed a higher correlation with pathological worry (PSWQ) than with depression symptoms (BDI), namely r = .55 and r = .49, respectively. As computations following formulas by Meng, Rosenthal, and Rubin (1992) showed, this difference was nonsignificant, Z = 1.00, ns.[1]

With respect to the individual symptoms, however, there were significant differences (Table 1). When bivariate correlations were computed, muscle tension showed a significant correlation with pathological worry, but none with depression symptoms. This difference was highly significant, Z = 3.65, p < .001. In contrast, difficulty concentrating showed a higher correlation with BDI scores than with pathological worry. This difference, however, was nonsignificant, Z = 1.76, ns. All other somatic symptoms showed about the same correlations with pathological worry and BDI scores. When partial correlations were calculated to control for the high correlation of PSWQ and BDI (r = .51, p < .001), the pattern became even more pronounced, particularly with respect to difficulty concentrating: The correlation between difficulty concentrating and pathological worry dropped to a value near zero when BDI scores were partialed out indicating that there is little shared variance of self-reported concentration difficulties and PSWQ scores. In comparison, the correlation between difficulty concentrating and BDI remained significant when worry was partialed out. For muscle tension, the partial correlations mirrored the zero-order correlations: Partialling out BDI scores did not attenuate the correlation between worry and muscle tension. The partial correlation was identical to the zero-order correlation. Partialling out worry, however, led to a nonsignificant inverse correlation between depression symptoms and muscle tension. For the other four somatic symptoms, the pattern of the partial correlations was virtually identical to that of the zero-order correlations.

Whereas the partial correlations considered the substantial overlap between worry and depression symptoms, they did not consider the substantial overlap among the somatic

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[1]Throughout this article, all significance tests are two-tailed.

symptoms (cf. Appendix). To examine the unique contribution of each symptom to the prediction of pathological worry and depression symptoms, we calculated two hierarchical regression analyses (Cohen & Cohen, 1983). In the first regression analysis, pathological worry was the criterion. In Step 1, BDI scores were entered as a predictor; in Step 2, the six somatic symptoms were entered simultaneously as predictors. In the second regression analysis, BDI was the criterion. In Step 1, pathological worry was entered, and in Step 2, the six somatic symptoms were entered (Table 2). Using this approach we tried to estimate the predictive value of the individual somatic symptoms for the unique variance of pathological worry (i.e., variance not shared with depression) and for the unique variance of depression symptoms (i.e., variance not shared with pathological worry). In the prediction of pathological worry, the set of somatic symptoms entered at Step 2 explained 15% of variance. However, only three symptoms made significant contributions to this prediction, namely restlessness, muscle tension, and sleep disturbance. As expected from the correlational analyses, muscle tension was the most powerful predictor with a positive regression weight of $\beta = .22$, $p < .001$. In the prediction of depression scores, the somatic symptoms entered at Step 2 explained again 15% of variance. Here too, only three symptoms made individually significant contributions, namely easily fatigued, difficulty concentrating, and muscle tension. Surprisingly, muscle tension was again the most powerful predictor, this time however with a negative regression weight of $\beta = -.23$, $p < .001$.

The comparison of (a) $r = .10$, the nonsignificant zero-order correlation of muscle tension with BDI scores, (b) $r = -.10$, the nonsignificant partial correlation of muscle tension with BDI scores while controlling for pathological worry, and (c) $\beta = -.23$, the significant regression weight of muscle tension in the prediction of BDI scores while simultaneously controlling for pathological worry and the other somatic symptoms, indicates that suppression effects are present. Thus, muscle tension acts as a suppressor variable for the prediction of depression scores through worry and the other somatic symptoms: It enhances the importance of the other predictors by virtue of suppression of irrelevant predictor variance (Tabachnik & Fidell, 1989). Furthermore partialling out shared variance of muscle tension and the other predictors enhances the predictive value of muscle tension scores revealing an inverse relation of muscle tension to BDI scores. Thus, the combination of the other predictors also suppresses irrelevant variance in muscle tension.

Discussion

The findings of the present study can be summarized as follows. From the six somatic symptoms that the DSM-IV associates with a diagnosis of generalized anxiety disorder (GAD), only muscle tension showed a unique and substantial correlation with pathological worry across all analyses. In contrast, difficulty concentrating showed a unique and substantial correlation with depression symptoms. Once depression scores were partialed out, the correlation between pathological worry and difficulty concentrating was near zero. The other four symptoms (restlessness, easily fatigued, irritability, and sleep disturbance) seemed to be common features of pathological worry and depressive symptomatology.

The findings concerning muscle tension and pathological worry corroborate recent findings that motor tension is a unique feature of GAD, differentiating GAD from other anxiety disorders and from the mood disorders. Recent views hold that GAD is characterized by autonomic inflexibility and that this rigidity is due to a chronic deficiency in parasympathetic tone (Borkovec & Newman, in press). Excessive muscle tension is one of the physiological markers of this deficiency. Interview-based findings previously have shown strong associations of motor tension symptoms to worry and GAD (Brown et al., 1995).

Psychophysiological findings have supported these self-reports as GAD clients have shown greater muscle tension reactivity (EMG) relative to controls, both at baseline and in response to laboratory challenges (Hoehn-Saric et al. 1989). Elevated muscle tension may therefore be the key somatic variable in a valid diagnosis of GAD, particularly with respect to a differentiation from depression.

Whereas muscle tension was found to be a strong indicator of pathological worry, difficulty concentrating was indicative of depressive symptomatology. Difficulty concentrating, which the DSM-IV associates with a diagnosis of GAD, showed no relation with pathological worry once depression scores were statistically controlled for. This indicates that this symptom may be more closely related to depression than to pathological worry. Research on memory deficits in depression has suggested a relation between concentration difficulties and depressed mood. Findings indicate that depressed mood imposes limitations on cognitive resources, for example, by allocating attention to task-irrelevant information or reducing attentional control towards distraction (Ellis & Ashbrook, 1988; Hasher & Zacks, 1988). In accordance, DSM-IV criteria for major depressive episode include "diminished ability to think or concentrate" (American Psychiatric Association, 1994). However, task-interference and difficulty concentrating are also highly characteristic of worry as numerous studies have demonstrated (see Eysenck, 1992, for a review). Future research will have to clarify if difficulty concentrating is a critical feature of depression (or of pathological worry) or if it is a common feature of both.

Apart from muscle tension and difficulty concentrating, all other DSM-IV symptoms showed equally high associations with pathological worry and depressive symptomatology. This pattern is much in line with previous findings indicating that the associated somatic symptoms were not particularly specific to GAD and that the "3 out of 6 criterion" was also met by clients with depression (Brown et al., 1995). As a consequence, Brown et al. suggested that at least four somatic symptoms be required for a diagnosis of GAD whereas Freeston et al. (1996) suggested that the somatic symptoms should not weigh more strongly for a diagnosis of GAD. The present findings may help to reconcile these opposing conclusions by suggesting that, within the total list of somatic symptoms, only muscle tension should weigh more strongly in the diagnosis of GAD. This could be achieved, for example, by introducing a point system in which muscle tension would count two points and all other symptoms would count one point each. To fulfill the somatic criteria list for a diagnosis of GAD, a "4 points criterion" could be introduced. This criterion would be fulfilled either by the presence of muscle tension and two other symptoms or by the presence of four symptoms not including muscle tension. Another, more radical alternative would be to extend the DSM-IV "3 out of 6 criterion" by demanding that muscle tension must be one of the (at least) three symptoms. This, however, would make muscle tension a necessary condition for a diagnosis of GAD: no client could receive a diagnosis of GAD if he or she did not report muscle tension. Whereas this may overvalue the empirical evidence concerning pathological worry and muscle tension, the current DSM-IV "3 out of 6 criterion" rather neglects the respective evidence. Not only does it weigh muscle tension and the other five symptoms equally, but it also considers them as interchangeable (i.e., which of the six symptoms are present does not matter as long as three are present). In contrast, our findings indicate that the six somatic symptoms do have different weights in the prediction of pathological worry. Consequently they are not interchangeable.

However, also the present study has limitations. These pertain mainly to three points. First, the findings need replication. Even though our sample was fairly large, multiple hypotheses testing with the same data may have led to inflation of error. Moreover the

stability of the β-weights needs to be investigated. Thus, replication of the present analysis in further samples is warranted. Second, the findings were obtained in a nonclinical student sample. Whereas the study of clinical phenomena in nonclinical populations has proven useful for the understanding of anxiety disorders--not only for GAD, but also for panic disorder (Norton, Cox, & Malan, 1992) and obsessive compulsive disorder (Turner, Beidel, & Stanley, 1992)--the utility of nonclinical studies for the understanding of major depression is much debated (cf. Coyne, 1994; Vredenburg, Flett, & Krames, 1993). This goes in particular for studies using the Beck Depression Inventory in student populations (Kendall, Hollon, Beck, Hammen, & Ingram, 1987). Whereas the present findings indicated that muscle tension may be the key variable to differentiate GAD and depression, only the analysis (or reanalysis) of clinical data for DSM-IV GAD and major depression can provide a conclusive answer to this problem. Third, the present study focused on depressive symptomatology. Symptoms of other mood and anxiety disorders have to be taken into account as well. Only this can prevent new problems of the kind that shifting the weights of some somatic criteria--or dropping some criteria altogether--increases the discriminant validity towards one disorder (e.g., panic disorder) while decreasing the discriminant validity toward another disorder (e.g., major depression). Elucidating the factors that may have mediated the low degree of discriminability of the associated somatic symptoms between GAD clients and clients with mood and other anxiety disorders is an important step in the creation of a meaningful nosological category and consequently in the reliable and valid assessment of generalized anxiety disorder.

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Table 1

Pathological Worry, Depression Symptoms, and DSM-IV GAD Somatic Symptoms: Zero-Order

Correlations and Partial Correlations

Somatic Symptom	Zero-order correlation		Partial correlation[a]	
	PSWQ	BDI	PSWQ.BDI	BDI.PSWQ
Restlessness	.44***	.41***	.30***	.24**
Easily fatigued	.36***	.37***	.21**	.24**
Difficulty concentrating	.28***	.40***	.09	.31***
Irritability	.35***	.34***	.21**	.21**
Muscle tension	.36***	.10	.36***	–.10
Sleep disturbance	.42***	.38***	.28***	.22**

Note. N = 183. PWSQ = Penn State Worry Questionnaire, BDI = Beck Depression Inventory, short-form

(after logarithmic transformation).

[a]PSWQ.BDI = PSWQ controlling for BDI, BDI.PSWQ = BDI controlling for PSWQ.

$p < .01$,*$p < .001$.

Table 2

Pathological Worry, Depression Symptoms, and DSM-IV GAD Somatic Symptoms: Hierarchical Multiple Regression Analyses

Criterion = PSWQ			Criterion = BDI		
Predictor	β	R² change	Predictor	β	R² change
Step1		.26***	Step 1		.26***
BDI	.36***		PSWQ	.36***	
Step 2		.15***	Step 2		.15***
Restlessness	.16*		Restlessness	.12	
Easily fatigued	.13		Easily fatigued	.14*	
Difficulty concentrating	−.10		Difficulty concentrating	.20**	
Irritability	.01		Irritability	.08	
Muscle tension	.22***		Muscle tension	−.23***	
Sleep disturbance	.14*		Sleep disturbance	.11	

Note. N = 183. PSWQ = Penn State Worry Questionnaire, BDI = Beck Depression Inventory, short form (after logarithmic transformation). β = standardized regression weight of predictors when all seven variables were entered (cf. Tabachnik & Fidell, 1987, p. 187), R² change = percent of variance accounted for by set of predictors at each step.

*p < .05,**p < .01,***p < .001.

Appendix

DSM-IV GAD Somatic Symptoms: Intercorrelations and Corrected Item-Total

Correlations

Somatic symptom	Somatic symptom					
	1.	2.	3.	4.	5.	6.
1. Restlessness	(.57)					
2. Easily fatigued	.26***	(.38)				
3. Difficulty concentrating	.38***	.32***	(.53)			
4. Irritability	.50***	.33***	.37***	(.56)		
5. Muscle tension	.34***	.20**	.30***	.37***	(.45)	
6. Sleep disturbance	.46***	.25**	.44***	.34***	.36***	(.54)

Note. N = 183. Each symptom was rated on a five-point scale from Not at all (0) to

Very severe (4). The off-diagonal elements are the item intercorrelations, the

diagonal elements (in parentheses) are the corrected item-total correlations.

p < .01,*p < .001.