

## Research Article

# THE UTILITY OF SOMATIC SYMPTOMS AS INDICATORS OF DEPRESSION AND ANXIETY IN MILITARY VETERANS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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*The interrelationship between medical illnesses and psychological distress has received increasing attention in the last several years. Partly at issue is the best way to diagnose mental health problems such as depression and anxiety in medical populations. Specifically, are somatic symptoms a valid indicator of depression and anxiety in a medical population? Furthermore, do anxiety and depression remain as distinct constructs for this population, or do they combine to represent general distress? We examine these issues using confirmatory factor analysis in a sample of 202 military veterans with chronic obstructive pulmonary disease. Results indicate best fit for a model of depression and anxiety for which the constructs remained separate rather than as combined indicators of general distress. Furthermore, in this model, somatic symptoms are retained as valid indicators of psychological distress for this sample. Depression and Anxiety 23:42–49, 2006. © 2005 Wiley-Liss, Inc.*

**Key words:** depression; anxiety; medical patients

## INTRODUCTION

The presence of depression and anxiety coexistent with medical conditions has received increasing attention in recent years [Kessler et al., 2002; Kurina et al., 2001; Wetherell and Arean, 1997]. Difficulties arise in distinguishing between the symptoms of psychological and physical illnesses, particularly as relates to somatic symptoms that may be common to both [Clark et al., 2000]. Because somatic symptoms that play a prominent role among DSM-IV criteria for both depressive and anxiety disorders [American Psychiatric Association, 1994] may reflect medical disease, they may be less useful in distinguishing between mentally ill and non-mentally ill medical patients. However, the evidence for the inclusion or exclusion of somatic symptoms for diagnosing depression and anxiety in medical patients is contradictory [e.g., Clark et al., 1996; Epkins, 1996; Persons et al., 2003; Watson et al., 1995; Woody et al., 1998; Zung et al., 1990]. Furthermore, given the high clinical overlap of depressive and anxiety disorders among medical patients [Aydin and Ulusahin, 2001; Huang, 1997; Nisenson et al., 1998; Zung et al., 1990], it is unclear whether depressive and anxiety disorders can be

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identified as distinct categories of psychological disturbance within this population, or whether these symptoms are more indicative of general distress coexistent with medical illness. Our study examines these issues in a sample of medical patients with chronic obstructive pulmonary disease (COPD). We chose COPD to provide a relatively homogeneous sample of medical patients reporting common somatic symptoms.

## ANXIETY AND DEPRESSION IN MEDICAL PATIENTS

A number of studies have indicated that anxiety and depression are common in medical patients [e.g., Freuhwald et al., 2001; McQuaid et al., 1999; Nisenson et al., 1998]. Prevalence of depressive disorders ranges from 5% [Kok et al., 1995] to 37% [Evans and Katona, 1994], and prevalence of anxiety disorders ranges from 13% to 51% [Withers et al., 1999; Yohannes et al., 2000]. Similar high rates of depression and anxiety have been reported in patients with COPD [Brenes, 2003; Dahlen and Janson, 2002; VanManen et al., 2002; Yohannes et al., 2000].

The presence of anxiety and/or depression has a negative impact on functional outcome and quality of life for medical patients. For example, dysthymic mood has been associated with higher levels of physical impairment [Kirby et al., 1999; Watts et al., 2002] and diminished quality of life [DeBeurs et al., 1999; Freuhwald et al., 2001] in medical patients. Anxiety also has been linked to higher rates of medical symptom experience and mortality, along with greater medical care utilization and poorer outcomes in medical populations [Kim et al., 2001]. As such, addressing depression and anxiety in medical patients may be crucial in fostering improved quality of life for such patients.

Several theories regarding the relationship between depression and anxiety are relevant to consider with regard to medical patients [for a full discussion, see Shankman and Klein, 2003]. These theories focus on the specific roles of positive affect (including positive, optimistic cognitions and “upbeat” behavior), negative affect (including negative, pessimistic cognitions and “downbeat” behavior), and physiological arousal (as indicated by increased sympathetic nervous system response) in the psychopathology of depression and anxiety. The best known of these is the “tripartite” theory of depression and anxiety [Clark and Watson, 1991]. This theory suggests that anxiety and depression both reflect the presence of negative affect symptoms (reflecting “general distress”), whereas depression alone is related to positive affect, and anxiety alone is related to physiological arousal. Another theory, the valence–arousal model, concerns the degree to which positive or negative (valence) thinking is more predictive of psychological adjustment [Calvete et al., 2005]. The approach–withdrawal model focuses on tendencies to approach or relate intimately to positive

stimuli as opposed to tendencies to withdraw from or avoid negative stimuli as predictors of psychological adjustment [Coan and Allen, 2003]. Current research [Shankman and Klein, 2003] does not support the predominance of one model over the others.

The utility of these models, and the relationship of anxiety and depression, may be of particular interest among older medical patients. In this population, somatic symptoms due to medical illnesses may make it difficult to identify and differentiate anxiety and depression. Nevertheless, the tripartite model has found some support with older adults. Cook et al. [2004] reported data in support of this model in a sample of 131 older psychiatric outpatients. Beck et al. [2003] also found a distinction between the experiencing of positive and negative affective symptoms among older adults with generalized anxiety disorder, although the experience of anxiety was closely linked to anger and differentiated from feelings of guilt and shame. Meeks et al. [2003], on the other hand, demonstrated that the tripartite model was no better in explaining symptoms of depression and anxiety in community-dwelling older adults than a one-factor distress model. As such, confusion remains as to whether and how anxiety and depression can be established as distinct constructs in older patients. This issue is likely even more complicated in samples with significant medical comorbidity.

## ASSESSING DEPRESSION AND ANXIETY IN GENERAL MEDICAL PATIENTS

The issue of whether depression and anxiety function as distinct constructs for medical patients has not yet been fully examined. In a sample of 197 older medical patients [Wetherell and Arean, 1997], items from the Beck Anxiety Inventory [BAI; Beck and Steer, 1993] and Beck Depression Inventory [BDI; Beck et al., 1988] were subjected to a principal components factor analysis, with the number of factors restricted to two. A similar analysis was conducted for items on the BAI and the Geriatric Depression Scale (GDS). In both cases, although a few items from each scale cross-loaded on the “opposite” factor, the authors concluded that depression and anxiety remained distinct and clinically useful constructs for general medical patients. Yet debate remains regarding the utility of depression and anxiety as separate and viable constructs for medical patients. Relatively few studies have examined these constructs in medical patients, although some research with nonmedical patients supports the possibility that depression and anxiety may reflect a single, unitary construct [Persons et al., 2003].

DSM-IV [American Psychiatric Association, 1994] criteria for depressive and anxiety disorders include a considerable number of somatic symptoms, such as

sleeplessness, racing heart, lack of energy, fatigue, and so forth. These same criteria are included in common diagnostic tools for evaluating depression and anxiety, such as the BDI [Beck et al., 1988] and the BAI [Beck and Steer, 1993]. However the nature and meaning of these symptoms for medical patients may be much different than for nonmedically impaired individuals. Given that many medical patients have somatic symptoms as a result of their general medical conditions, utilizing these symptoms in measures of depression and anxiety may increase the likelihood of false positives.

In support of this possibility, one study of 598 medical patients [Volk et al., 1993] found that somatic items on the short screening version of the BDI tended to elevate the potentiality of false-positive scores. This study is interesting in light of the work by Wetherell and Arean [1997] suggesting that somatic symptoms remain viable components of depression and anxiety measures in medical patients. There seems to remain some confusion in the literature not only with regard to the extent to which depression and anxiety are separate and viable constructs for medical patients but also related to the utility of somatic symptoms as a clinical indicator of either disorder.

The particular involvement of somatic symptoms with medical patients may ultimately have a large impact on the goodness of fit for anxiety and depression as separate and distinct factors. For example, factor analyses of the BDI [Viljoen et al., 2003], as well as a confirmatory factor analysis (CFA) of the BAI with medical patients [Wetherell and Arean, 1997], suggest distinct somatic factors. To date, no study has compared alternate factor models of depression and anxiety in medical patients.

CFA techniques may be helpful in elucidating the relative "goodness of fit" of distinct or combined anxiety and depression models. We chose this method of evaluation to test the relative utility of several models of depression and anxiety in explaining these conditions in our current sample of older medical patients. Given that our current study is based on preexisting theoretical models of psychopathology derived through exploratory factor-analytic studies, we viewed CFA as the best tool to answer our current questions. Given the high frequency of medically explained somatic symptoms in adults with physical illnesses, it may be that the variance accounted for by somatic items on instruments such as the BDI and BAI is less able to differentiate psychopathology in medical patients than in nonmedical patients. Such concerns led to the development of the Beck Depression Inventory for Primary Care (BDI-PC), a version of the BDI with somatic items removed, which has demonstrated good psychometric properties with medical patients [Beck et al., 1997].

Several possible models of distress for medical patients appear possible. Anxiety and depression may exist as separate constructs [e.g., Clark et al., 1996;

Epkins, 1996; Woody et al., 1998], or they may reflect a single underlying distress construct [Persons et al., 2003; Zung et al., 1990]. In either case, somatic symptoms either may be relevant psychological indicators [e.g., Wetherell and Arean, 1997] or may not be relevant for medical patients [e.g., Volk et al., 1993]. Thus, because there is no agreement in either theory or empirical evidence as to the interactional nature of depression and anxiety, and somatic symptoms in older medical patients, an opportunity to test the relative fit of these four models to a set of research data may help in evaluating which of these models is the best explanation for the data. Thus, four separate potential models of depression and anxiety in older medical patients (discussed below) appear worthy of evaluation.

The purpose of our study was to examine the constructs of depression and anxiety, and the role of somatic symptoms among medical patients with pulmonary disease. To test models of depression and anxiety that have existing empirical support (factor loadings used in this study were based upon medical patient sample item loadings on BDI factor scales developed by Viljoen et al. [2003] and item loadings for BAI factors developed by Wetherell and Arean [1997]), this study compares the relative utility of four potential alternate factor models. The Viljoen et al. study [2003] was used as the primary guide for the factor structure for the BDI due to its distinction between affective and somatic symptoms of depression that allow for an empirically supported, separate analysis of these symptoms in a CFA, as well as the general similarity of these findings with other factor-analytic studies of the BDI [e.g., Storch et al., 2004]. The four factor models are as follows:

1. Anxiety and depression comprise two separate factors, with somatic symptoms retained within each as valid indicators of psychopathology (two-factor model).
2. Anxiety, depression, and somatic symptoms comprise three separate and distinct factors (three-factor model).
3. Anxiety and depression coexist as parts of a combined general distress factor, with somatic symptoms retained as a valid indicator of psychological distress (one-factor model).
4. Anxiety and depression coexist as parts of a combined general distress factor, with somatic symptoms comprising a second distinct factor (two-factor model).

These four models were compared through CFA in a sample of medical patients with COPD. A comparison of the relative goodness of fit of these four models may help in the conceptualization, diagnosis, and treatment of depression and anxiety in medical patients.

## METHODS

### PARTICIPANTS

Using the Veterans Administration (VA) outpatient and inpatient treatment files, we targeted all persons who received care at the Houston VAMC in the previous year and had a diagnosis of a chronic pulmonary disease ( $N = 9,664$ ), according to *International Classification of Diseases* (ICD-9) criteria, for recruitment into a study that provided treatment for depression and anxiety. Details about recruitment are reported elsewhere [Kunik et al., 2005]. This study is based on data from 202 patients with COPD and significant anxiety and depression (see Procedures section for details of participant selection procedure). The average age of the sample was 65.7 ( $SD = 10.7$ ) years. Participants were 96% male, and ethnicity distribution was as follows: 80.7% Caucasian, 2.5% Hispanic, 14.9% African American, and 2% Native American.

### MEASURES

#### *Depression severity: Beck Depression Inventory–II.*

The BDI-II was utilized to assess for symptoms of depression. This measure is 21-item assessment of the severity of depression to be used in people ages 13 and over [Beck, 1996]. Scores on each item range from 0 to 3. Scores ranging from 0 to 13 are indicative of minimal depression; from 14 to 19, of mild depression; from 20 to 28, of moderate depression; and from 29 to 63, of severe depression. A cutoff score of 14 was utilized for inclusion in the study on the basis of screening positive for depression [Beck, 1996]. Individual items were summed into factor scores (as discussed in the Data Analysis section) for analysis in the CFA.

*Anxiety severity: Beck Anxiety Inventory.* The BAI [Beck, 1990] is a 21-item, self-report measure of anxiety that has strong psychometric characteristics when used in samples of community-dwelling older adults [Morin et al., 1999] and older medical patients [Wetherell and Arean, 1997]. Factor analyses also consistently suggest a differentiation of somatic and subjective or cognitive factors among reports of anxiety in younger and older adults [Beck 1990; Morin et al., 1999; Wetherell and Arean, 1997]. Research on this instrument [Beck, 1990] suggests the following ranges for interpreting the person's level of anxiety: 0–7 indicates minimal anxiety; 8–15 indicates mild anxiety; 16–25 indicates moderate anxiety; and 26–63 indicates severe anxiety. Criteria for inclusion on the basis of screening positive for anxiety included a score of 16 or greater on the BAI. A BAI cutoff score of 16 was selected given that this score represents anxiety severity that is one standard deviation above the mean for both a normal community sample [Gillis et al., 1995;  $M = 6.6$ ,  $SD = 8.1$ ] and an elderly medical sample [Steer et al., 1994;  $M = 7.2$ ;  $SD = 6.78$ ]. Individual

items were summed into factor scores (as discussed in the Data Analysis section) for analysis in the CFA.

### PROCEDURE

Participants provided informed consent before the administration of the assessment. Participants were first screened for the presence of depression and/or anxiety symptoms. The determination for inclusion into the study, based on symptoms of anxiety and/or depression, was made by a score of 14 or greater on the BDI-II, or a score of 16 or greater on the BAI.

If such levels of depression or anxiety were present, then a portable spirometry was administered to confirm COPD diagnosis. If participants met the COPD diagnosis ( $FEV_1/FVC < 75\%$  and  $FEV_1 < 70\%$ )<sup>1</sup>, then they were screened for adequate cognitive functioning [Mini-Mental State Examination (MMSE)  $\geq 24$ ] and the absence of psychotic disorders. These selection procedures were used to ensure that this sample was of individuals who had current symptoms of COPD and comorbid depression and anxiety. Because our goal in this study was to examine the phenomenon of depression and anxiety in medical patients with COPD, limiting the sample to individuals with both current COPD and comorbid depression or anxiety was necessary. Including people without both COPD and comorbid depression and/or anxiety would likely distort the sample of interest and the resultant conclusions of the study. Assessments were conducted by Bachelor's-level research assistants. All procedures conducted were approved by the Baylor College of Medicine Institutional Review Board and complied with American Psychological Association (APA) ethical standards.

### DATA ANALYSIS

We evaluated the four factor models using CFA. Individual items from the BDI and the BAI that loaded on these factors were specified in previous principal components factor-analytic studies [see Viljoen et al., 2003, and Wetherell and Arean, 1997, respectively for complete lists of individual items]. We used CFA in this study because it is the most effective means of evaluating relative “goodness of fit” of competing theoretical models. Individual items were combined into item “parcels,” or factor scores, in accordance with the previously mentioned studies for this analysis. CFAs were conducted on a Statistica statistical package.

<sup>1</sup>FEV<sub>1</sub> refers to forced expiratory volume; FVC refers to forced vital capacity. Both refer to amount of air volume expelled from the lungs during expiration, although FEV<sub>1</sub> is usually only the first second of expiration, whereas FVC is total expiration volume. These are means of estimating lung volume capability and indicators of breathing ability.

## RESULTS

On the BDI, participants in the study obtained a mean score of 22.8 ( $SD = 9.74$ ). On the BAI, participants in this study obtained a mean score of 21.9 ( $SD = 8.14$ ). Regarding depression, 174 (86.1%) participants met the BDI cutoff score of 14 for depression. Regarding anxiety, 156 (77.2%) of the participants met the BAI cutoff score of 16 for anxiety. Of this number, 131 (64%) met BDI and BAI criteria for both moderate anxiety and depression. We obtained primary diagnoses of all participants using the Structured Clinical Interview for DSM-IV [SCID; First et al., 1997]. Of the current sample, 61 (30.2%) participants met diagnostic criteria for a depressive disorder. Regarding anxiety disorder, 64 (31.7) participants met criteria for an anxiety disorder as primary diagnosis. One person (0.5%) had a substance abuse disorder as the first diagnosis, and 76 (37.6%) subjects did not meet diagnostic criteria for any disorder.

The results from the CFAs, presented in Table 1, indicated that a two-factor model, with separate depression and anxiety factors, was the best fit for the data. Goodness of fit can be evaluated both by a nonsignificant  $\chi^2$  analysis and by several goodness-of-fit indices such as the "normed fit index" [for a discussion of goodness-of-fit indices, see Lance and Vandenberg, 2002]. Goodness of fit is indicated by either a nonsignificant  $\chi^2$  score or by fit indices of .90 or higher. The root-mean-square error of approximation (RMSEA) is often suggested as one of the better fit indices, because it is less sensitive to sample size [Fabrigar et al., 1999]. An RMSEA value less than .10 is considered an indication of good fit. As indicated in Table 1, only the two-factor anxiety/depression model indicated adequate goodness of fit. The  $\chi^2$  score was nonsignificant, the RMSEA was below .10, and the fit indices were all above .90. None of these conditions was true for any of the three other models. Under this model, somatic symptoms were included as part of these factors, rather than as a distinct and separate factor from depression and anxiety. Parameter estimates, which essentially function as estimates of the size of the relationship between measures and latent constructs as calculated by the CFA, for this model are presented in Figure 1. Alternate models with either

combined anxiety and depression, or separated out somatic symptoms as a distinct factor did not have a good fit to the data. These results support a model in which anxiety and depression comprise two separate factors, and somatic symptoms are not represented by an additional factor among medical patients with COPD.

## DISCUSSION

The results of this study suggest that for a sample of military veterans with COPD, depression and anxiety functioned as distinct constructs, albeit related, with somatic symptoms serving as valid indicators of each set of symptoms. These findings are consistent with data from a study by Wetherell and Arean [1997] with older medical patients who were not screened for depression or anxiety. The results from our study confirmed this factor structure of depression and anxiety in a population of medical patients without depression and/or anxiety. It bears mentioning that Wetherell and Arean's study included older medical patients in general care, who were not specifically screened for high depression and anxiety. Our study narrows the focus somewhat specifically to individuals with comorbid COPD and depression and/or anxiety. Thus, within the specific population of older medical patients with comorbid depression and/or anxiety, our results suggest that somatic symptoms remain valid indicators of these conditions despite the presence of COPD as a possible somatic confound.

Given that many individuals with COPD often have breathing difficulties and other somatic symptoms that result from their disease rather than from anxiety and depression, it is interesting to note that somatic symptoms nonetheless appear to be viable indicators of depression and anxiety for this population. Individuals with anxiety and/or depression may be more sensitive to their physical symptoms and may therefore more acutely report these somatic symptoms despite their relative ubiquity in this population. Although patients with COPD may have more somatic symptoms than nonmedical patients, their perception of these symptoms may be partially dependent upon their anxiety and depression, thus retaining these somatic

**TABLE 1. Confirmatory factor analysis results**

Model	$\chi^2$	<i>df</i>	<i>P</i> -value	GFI	NFI	CFI	RMSEA
Single distress factor	114.98	9	.001	.859	.697	.709	.223
Two-factor, depression and anxiety	15.07	8	.057	.976	.960	.981	.060
Two-factor, distress and somatic	235.39	10	.001	.768	.380	.382	.293
Three-factor, depression, anxiety, and somatic	252.95	11	.001	.743	.334	.336	.299

*Note.* GFI, goodness-of-fit index; NFI, normed fit index; CFI, comparative fit index.

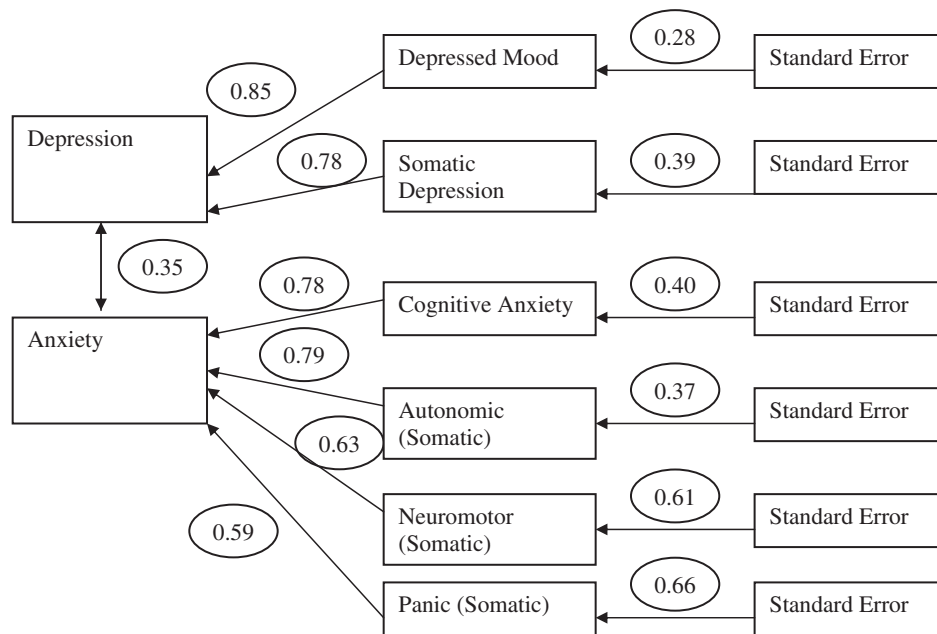


Figure 1. Parameter estimates for confirmatory factor analysis.

symptoms as valid indicators of psychological distress. As such, the results of this study indicate that somatic symptoms continue to be valid indicators of depression and anxiety for this population. Although truncated measures such as the BDI-PC may still be necessary for other medical conditions, a modified version may not be warranted for patients with respiratory difficulties.

It should be noted that the DSM-IV allows for patients with medical disorders to be diagnosed with either separate anxiety and mood disorders, such as major depressive disorder or generalized anxiety disorder, or with mood disorder due to a general medical condition and/or anxiety due to a general medical condition. These second “due to” diagnostic options are intended to represent direct effects of the illness as opposed to comorbid depression or anxiety that results from the stress or loss associated with illness. These diagnostic options were not distinguished in this study, although the results suggest that depression and anxiety are viable constructs whether they are separate from or due to a general medical condition. Nonetheless, further analyses examining specific differences in symptomatology expressed in cases of “separate” mood and anxiety disorders and “due to” mood and anxiety disorders would be a worthwhile avenue of study.

Weaknesses of this study lie primarily in the area of restricted range on measures of depression and anxiety, as well as across COPD symptoms. Given that inclusion criteria included the presence of both significant breathing difficulty and depression or anxiety, as indicated by the BDI and the BAI, the relation of these constructs was not tested across all possible ranges. This was done to test the constructs of

depression and anxiety in individuals who tested positive for these disorders, as well as COPD. For example, it is likely more difficult to notice appreciable effects for depression and anxiety on breathing ability in a sample of individuals who all have confirmed breathing difficulties. In future studies, it may have been helpful to include individuals with only limited symptoms of pulmonary disease and/or patients with breathing difficulties but no anxiety or depression. Future research to address these limitations, as well as to include a more representative sample of women, in future studies would be helpful. It also bears mentioning to note that the BDI and BAI use somewhat different response methods. Differences in these response methods may have increased the concordance of items on each of these measures, as opposed to between these measures, increasing the likelihood of a two-factor depression/anxiety model having a better fit than alternative models. Nonetheless, alternative models simply had poor fit overall, and this issue would have been a greater concern if several of the competing models had been closer to each other in terms of fit (i.e., several models generally had good fit to the data, with one being slightly better than the others). It also bears mentioning that using more and broader measures of diagnoses (such as the SCID) to screen all potential participants for depressive and/or anxiety diagnoses would likely increase the reliability of those diagnoses. However, implementing such a procedure would likely prove difficult due to the time constraints of screening large numbers of potential participants.

The results of this study suggest that depression and anxiety remain distinct constructs for a sample of medical patients with COPD. In this sample,

somatic symptoms retained their usefulness as associated symptoms of depression and anxiety. As such, this article provides further information regarding the utility of these constructs for medical patients with COPD.

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