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### A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7

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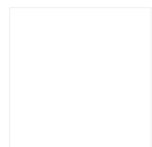
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#### Abstract and Figures

Generalized anxiety disorder (GAD) is one of the most common mental disorders; however, there is no brief clinical measure for assessing GAD. The objective of this study was to develop a brief self-report scale to identify probable cases of GAD and evaluate its reliability and validity. A criterion-standard study was performed in 15 primary care clinics in the United States from November 2004 through June 2005. Of a total of 2740 adult patients completing a study questionnaire, 965 patients had a telephone interview with a mental health professional within 1 week. For criterion and construct validity, GAD self-report scale diagnoses were compared with independent diagnoses made by mental health professionals; functional status measures; disability days; and health care use. A 7-item anxiety scale (GAD-7) had good reliability, as well as criterion, construct, factorial, and procedural validity. A cut point was identified that optimized sensitivity (89%) and specificity (82%). Increasing scores on the scale were strongly associated with multiple domains of functional impairment (all 6 Medical Outcomes Study Short-Form General Health Survey scales and disability days). Although GAD and depression symptoms frequently co-occurred, factor analysis confirmed them as distinct dimensions. Moreover, GAD and depression symptoms had differing but independent effects on functional impairment and disability. There was good agreement between self-report and interviewer-administered versions of the scale. The GAD-7 is a valid and efficient tool for screening for GAD and assessing its severity in clinical practice and research.



The generalized...

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## ORIGINAL INVESTIGATION

# A Brief Measure for Assessing Generalized Anxiety Disorder

## The GAD-7

Robert L. Spitzer, MD; Kurt Kroenke, MD; Janet B. W. Williams, DSW; Bernd Löwe, MD, PhD

**Background:** Generalized anxiety disorder (GAD) is one of the most common mental disorders; however, there is no brief clinical measure for assessing GAD. The objective of this study was to develop a brief self-report scale to identify probable cases of GAD and evaluate its reliability and validity.

**Methods:** A criterion-standard study was performed in 15 primary care clinics in the United States from November 2004 through June 2005. Of a total of 2740 adult patients completing a study questionnaire, 965 patients had a telephone interview with a mental health professional within 1 week. For criterion and construct validity, GAD self-report scale diagnoses were compared with independent diagnoses made by mental health professionals; functional status measures; disability days; and health care use.

**Results:** A 7-item anxiety scale (GAD-7) had good re-

liability, as well as criterion, construct, factorial validity. A cut point was identified with optimized sensitivity (89%) and specificity (82%). Scores on the scale were strongly associated with multiple domains of functional impairment (all 6 Medical Outcomes Study Short-Form General Health Survey and disability days). Although GAD and depression frequently co-occurred, factor analysis identified them as distinct dimensions. Moreover, GAD symptoms had differing but independent effects on functional impairment and disability. There was good agreement between self-report and independently administered versions of the scale.

**Conclusion:** The GAD-7 is a valid and efficient screening for GAD and assessing its severity for clinical practice and research.

*Arch Intern Med.* 2006;166:1092-1097

**Author Affiliations:** Biometrics Research Department, New York State Psychiatric Institute and Department of Psychiatry, Columbia University, New York (Drs Spitzer and Williams); Regenstrief Institute for Health Care and Department of

ONE OF THE MOST COMMON anxiety disorders seen in general medical practice and in the general population is generalized anxiety disorder (GAD). The disorder has an estimated current prevalence in general medical practice of 2.8% to 8.5%<sup>1-3</sup> and in the general population of 1.6% to 5.0%.<sup>4-6</sup> Whereas depression in clinical settings has generated substantial research, there have been far fewer studies of anxiety. In part, this may be because of the paucity of brief validated measures for anxiety compared with the numerous measures for depression,<sup>7,8</sup> such as the Primary Care Evaluation of Mental Disorders 9-item Patient Health Questionnaire (PHQ).<sup>9-11</sup> This situation is unfortunate, given the high

proprietary nature, lack of use as a diagnostic and severity measure, and requirement of clinician administration rather than patient self-report.<sup>18</sup> The objective of this study was to develop a brief self-report scale to identify probable cases of GAD and assess symptom severity. We conducted a study in multiple primary care settings to select the items for the final scale and evaluate its reliability and validity.

## METHODS

### GAD SCALE DEVELOPMENT

We first selected potential items for the scale. The initial item pool consisted of 100 items that reflected all of the *Diagnostic and*

Medicine, Indiana University, Indianapolis (Dr Kroenke); and Department of Psychosomatic and General Internal Medicine, University of Heidelberg, Heidelberg, Germany (Dr Löwe).

prevalence of anxiety disorders, as well as their associated disability and the availability of effective treatments, both pharmacological and nonpharmacological.<sup>12,13</sup>

Measures of anxiety are seldom used in clinical practice because of their length,

cal Manual of Mental Disorders, Fourth Edition (DSM-IV) symptom criteria for anxiety disorders on the basis of review of anxiety scales. A 13-item questionnaire was developed that asked patients how often in the last 2 weeks, they were bothered by various symptoms. Response options were "not at

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eral days," "more than half the days," and "nearly every day," scored as 0, 1, 2, and 3, respectively. In addition, an item to assess duration of anxiety symptoms was included. Our goal was to determine the number of items necessary to achieve good reliability and procedural, construct, and diagnostic criterion validity.

### PATIENT SAMPLE

Patients were enrolled from November 2004 through June 2005 from a research network of 15 primary care sites located in 12 states (13 family practice, 2 internal medicine) administered centrally by Clinvest, Inc (Springfield, Mo). The purpose of the project's first phase (n=2149) was to select the scale items and cutoff scores to be used for making a GAD diagnosis. The purpose of the second phase (n=591) was to determine the scale's test-retest reliability. In all, 2982 subjects were approached and 2739 (91.9%) completed the study questionnaire with no or minimal missing data. To minimize sampling bias, we approached consecutive patients at each site in clinic sessions until the target quota for that week was achieved.

In the first phase, 1654 subjects also agreed to a telephone interview, and of these, a random sample of 965 were interviewed within 1 week of their clinic visit by 1 of 2 mental health professionals (MHPs)—a PhD clinical psychologist and a senior psychiatric social worker. In the study's second phase, 591 subjects who had completed the research questionnaire were sent a 1-page questionnaire that consisted of the 13 potential GAD scale items. Of these, 236 subjects returned the completed 1-page questionnaire with no or minimal missing data within a week of completing the research questionnaire at the clinic. The mean GAD scale score of subjects returning the questionnaire did not differ from that of subjects who did not return the questionnaire. The study was approved by the Sterling Institutional Review Board, Springfield, Mo.

### SELF-REPORT RESEARCH QUESTIONNAIRE

Before seeing their physicians, patients completed a 4-page questionnaire that included the 13 items being tested for use in the GAD scale, as well as questions about age, sex, education, ethnicity, and marital status; the Medical Outcomes Study Short-Form General Health Survey (SF-20),<sup>20,21</sup> which measures functional status in 6 dimensions; and either the 12-item anxiety subscale from the Symptom Checklist-90<sup>16</sup> (first study phase only) or the Beck Anxiety Inventory<sup>14</sup> (second study phase only). Depression was assessed with the PHQ-8, which includes all items from the PHQ-9 except for the item about suicidal ideation; PHQ-8 and PHQ-9 scores are highly correlated and have nearly identical operating characteristics.<sup>22</sup> Finally, patients completed items regarding physician visits and disability days during the previous 3 months.

### MHP INTERVIEW

The 2 MHPs conducted structured psychiatric interviews by telephone, blinded to the results of the self-report research questionnaire. The interview consisted of the GAD section of the Structured Clinical Interview for DSM-IV,<sup>23</sup> modified with several additional questions to assess in greater detail some of the GAD diagnostic criteria of DSM-IV. The resulting DSM-IV GAD

### DATA ANALYSIS

The best items for the GAD scale were selected by examining the correlation of each item with the total 13-item score in the sample of 1184 patients who did not undergo a telephone interview. Item-total score correlations were reexamined in independent subsamples of the study population: patients who underwent the MHP interview and patients in the second phase of the study. In addition, we conducted receiver operating characteristic analyses with various numbers of items in these 965 patients by using a diagnosis of GAD as the criterion standard. Divergent validity of each item was assessed by calculating the difference between the item correlations with the 13-item anxiety scale and the PHQ-8 depression score. Convergent validity was examined by examining correlations of the final version of the scale with the Beck Anxiety Inventory and the anxiety disorder Symptom Checklist-90, even though neither is specific for GAD.

To assess construct validity, we used analysis of variance to examine associations between anxiety severity and the final GAD scale and SF-20 functional status scores, reported disability days, and physician visits, controlling for demographic variables. For criterion validity, we examined sensitivity, specificity, predictive values, and likelihood ratios for a range of cutoff scores of the final scale with respect to the MHP diagnosis. To investigate whether anxiety as measured by the GAD-7 and depression as measured by the PHQ-8 reflect distinct dimensions, we assessed convergent validity by using confirmatory factor analysis, procedural validity and test-retest reliability were assessed by means of intraclass correlation.<sup>25</sup>

### RESULTS

#### DESCRIPTION OF PATIENTS

The mean (SD) age of the patients was 47.4 (11.2) years (range, 18-95 years). Most (65%) were female; white non-Hispanic, 8% were African American, 13% were Hispanic; 64% were married, 13% were widowed, and 15% were never married; and 31% had a high school degree or equivalent, whereas 62% had attended college.

#### ITEM SELECTION FOR THE GAD SCALE

The GAD-7 (Figure 1) consists of the 7 items with the highest correlation with the total 13-item score ( $r=0.75-0.85$ ). Receiver operating characteristic analysis with this set of items showed an area under the curve (0.906) as good as scales with as few as 4 items from the full 13-item set. These 7 items also had the highest rank correlations in the development sample (n=1184) and the 2 replication samples (n=591). The 2 core criteria (A and B) of the definition of GAD are captured by the first 2 items of the scale.<sup>26</sup> Of note, 6 of the 7 items had the highest divergent validity (ie, the highest difference

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diagnosis, with the DSM-IV 6-month criterion standard for assessing the validity of the new scale. The interview also included the 13 potential GAD scale items to test agreement between self-report and clinician administration (ie, procedural validity).<sup>24</sup>

the item-total scale score correlation and its depression score correlation [ $\Delta r=0.16-0.21$ ]; each of the 7 items is scored from 0 to 3, its scale score ranges from 0 to 21.

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GAD-7

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
<b>Total Score</b>	= Add Columns + + +			

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
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Figure 1. The generalized anxiety disorder 7-item (GAD-7) scale.

RELIABILITY AND PROCEDURAL VALIDITY

The internal consistency of the GAD-7 was excellent (Cronbach  $\alpha = .92$ ). Test-retest reliability was also good (intraclass correlation=0.83). Comparison of scores derived from the self-report scales with those derived from the MHP-administered versions of the same scales yielded similar results (intraclass correlation=0.83), indicating good procedural validity.

DIAGNOSTIC CRITERION VALIDITY AND SCALE OPERATING CHARACTERISTICS

Table 1 summarizes the operating characteristics of the GAD-7 at various cut points. As expected, as the cut point increases, sensitivity decreases and specificity increases in a continuous fashion. At a cut point of 10 or greater, sensitivity and specificity exceed 0.80, and sensitivity is nearly maximized. Results were similar for men and women and for those aged less and those aged more than the mean age of 47 years. The proportion of primary care patients who score at this level is high (23%). A cut point of 15 or greater maximizes specificity and approximates a prevalence (9%) more in line with current epidemiologic estimates of GAD prevalence in primary care. However, sensitivity at this high cut point is low (48%). Most patients (89%) with GAD had GAD-7 scores of 10 or greater, whereas most patients (82%) without GAD had scores less than 10.

The mean (SD) GAD-7 score was 14.4 (4.7) in the 73 patients with GAD diagnosed according to the MHP and 4.9 (4.8) in the 892 patients without GAD. The prevalence of GAD according to the MHP interview was 9% in women and 4% in men. In the entire sample of 2739 patients, the mean GAD-7 score was 6.1 in women and 4.6 in men.

Although the GAD-7 scale inquires about symptoms in the past 2 weeks, the criterion-standard MHP interview required at least a 6-month duration of symptoms consistent with DSM-IV diagnostic criteria for GAD. None-

chronic symptoms. Of the 433 patients with GAD of 10 or greater, 96% had symptoms for 1 month and 67% had symptoms for 6 months or more.

CONSTRUCT VALIDITY

There was a strong association between increasing severity scores and worsening function on a number of scales (Table 2). As GAD-7 scores went from moderate to severe, there was a substantial stepwise decline in functioning in all 6 SF-20 domains. Pairwise comparisons within each SF-20 scale between successive GAD-7 severity levels were significant. The relationship between GAD severity and functional impairment was similar in men and women.

Figure 2 illustrates graphically the relationship between increasing GAD-7 scale scores and worse functional status. Decrements in SF-20 scores are shown in terms of effect size (ie, the difference in mean SF-20 scores expressed as the number of SDs, between each GAD-7 severity subgroup and the reference group). The reference group is the group with the lowest GAD-7 scores (ie, the SD used is that of the entire sample). Effect sizes of 0.5 and 0.8 are typically considered moderate and large group differences, respectively.<sup>27</sup>

When the GAD-7 was examined as a continuous variable, its strength of association with the SF-20 was concordant with the pattern seen in Figure 2. It correlated most strongly with mental health (lowered by social functioning (0.46), general health perceptions (0.44), bodily pain (0.36), role functioning (0.33), and physical functioning (0.30).

Table 3 shows the association between GAD-7 severity levels and 3 other measures of construct validity: self-reported disability days, clinic visits, and general amount of difficulty patients attribute to their symptoms. Greater levels of anxiety severity were associated with a monotonic increase in disability days, physician use, and symptom-related difficulty in activities of daily living. When the GAD-7 was examined as a continuous variable, its correlation was 0.27 with disability days, 0.22 with physician visits, and 0.63 with symptom-related difficulty.

Convergent validity of the GAD-7 was demonstrated by its correlations with 2 anxiety scales: the Anxiety Inventory ( $r=0.72$ ) and the anxiety Symptom Checklist-90 ( $r=0.74$ ). Consistent with previous studies of anxiety and depression, GAD-7 and Symptom Checklist-90 anxiety scores were strongly correlated with our depression measure, the PHQ-8 ( $r=0.75$  and  $r=0.74$ , respectively). No redundancy in measuring anxiety and depression was demonstrated. We determined the prevalence of high anxiety and high depression symptoms in our sample, defined as severe scores ( $\geq 15$  on GAD-7 and PHQ-8 depression scales, respectively). Of 2114 patients who completed the GAD-7 and PHQ-8, there were 1877 (88.8%) patients with neither high anxiety nor high depression, 99 (4.68%) with high anxiety only, 68 (3.2%) with high depression only, and 68 (3.2%) with high anxiety and high depression.

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theless, the operating characteristics of the scale were good with high anxiety and high depression. Thus, because most patients with high symptom scores had half (99/169) of patients with high anxiety sco

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Citations (7,568)

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... This scale consists of 9 items that evaluated the frequency of depressive symptoms in the previous two weeks, which are rated on a Likert scale ranging from 0 ("not at all") to 3 ("nearly every day"). The PHQ-9 scores reflect 5 categories of severity of depressive disorders: None (0-

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4), mild (5-9), moderate (10)(11)(12)(13)(14), moderately severe (15)(16)(17)(18)(19), and severe (20)(21)(22)(23)(24)(25)(26)(27). In studies carried out in Latin America, PHQ-9 has been proven to be a valid and reliable tool for detecting depressive symptoms in various types of populations (17,18). ...

... Generalized Anxiety Disorder-7 (GAD-7) was used, which is a valid and efficient scale to assess the severity of anxiety disorders in clinical practice and investigation (20). The scale consists of 7 items that evaluate the anxiety symptomatology during the two weeks prior to the application of the scale. ...

... Each item is rated according to a Likert scale ranging from 0 ("not at all") to 3 ("nearly every day"). GAD-7 reflects 4 categories of severity of the anxiety disorder: normal (0-4), mild (5-9), moderate (10)(11)(12)(13)(14), and severe anxiety (15)(16)(17)(18)(19) (20) (21). This scale has been translated into Spanish and validated (21). ...

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... The score for GAD-7 ranges from 0 to 21; more than 5 points represent the presence of anxiety. A normal anxiety score ranges from 0 to 4, mild anxiety ranges from 5 to 9, moderate anxiety ranges from 10 to 14, and severe anxiety ranges from 15 to 21 (Spitzer et al., 2006). ...

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... We used the GAD-7 (Spitzer, Kroenke, Williams, & Lowe, 2006) to assess for generalized anxiety disorder. The GAD-7 has been evaluated in a number of populations and has shown good psychometric properties in several studies (Kroenke et al., 2010;Lowe et al., 2008). ...

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... Generalized Anxiety: Symptoms of generalized anxiety were measured using the Generalized Anxiety Disorder 7-item Scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) . Like the PHQ-9, respondents indicate how often they have been bothered by each symptom over the last two weeks on a 4-point Likert scale. ...

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● Daniela Heddaeus · ● Jörg Dirmaier · ● Martin Härter · [...] · ● Moritz Rosenkranz

The aims of COMET are implementation and evaluation of effectiveness, processes and cost-effectiveness of an innovative collaborative and stepped care model for depressive anxiety disorders and [...]



or an innovative collaborative and stepped care model for depressive, anxiety, somatoform and ... [\[more\]](#)

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Screening Tool for Anxiety Disorders: Development and Validation of the Korean Anxiety Screening Ass...

November 2018 · Psychiatry Investigation

Yeseul Kim · Yeonsoo Park · Gyeongcheol Cho · [...] · Kee-Hong Choi

Objective: This study evaluated the psychometric properties of the Korean Anxiety Screening Assessment (K-ANX) developed for screening anxiety disorders. Methods: Data from 613 participants were analyzed. The K-ANX was evaluated for reliability using Cronbach's alpha, item-total correlation, and test information curve, and for validity using focus group interviews, factor analysis, ... [\[Show full abstract\]](#)

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An Ultra-Brief Screening Scale for Anxiety and Depression: The PHQ-4

November 2009 · Psychosomatics

Kurt Kroenke · Robert L. Spitzer · Janet B W Williams · Bernd Löwe

The most common mental disorders in both outpatient settings and the general population are depression and anxiety, which frequently coexist. Both of these disorders are associated with considerable disability. When the disorders co-occur, the disability is even greater. Authors sought to test an ultra-brief screening tool for both. Validated two-item ultra-brief screeners for depression and ... [\[Show full abstract\]](#)

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Article

Gastrointestinal symptoms in primary care: Prevalence and association with depression and anxiety

June 2008 · Journal of Psychosomatic Research

Kurt Kroenke · Robert L. Spitzer · Bernd Löwe · [...] · Monika Mussell

Results from general population studies suggest a relationship between gastrointestinal (GI) symptoms, depression, and anxiety. However, no primary care study has investigated this issue. This study investigates the prevalence of GI symptoms in primary care and their association with depression and anxiety. Within a cross-sectional survey, 2091 consecutive patients from 15 primary care clinics in ... [\[Show full abstract\]](#)

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Article

The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener

December 2003 · Medical Care

Kurt Kroenke · Robert L. Spitzer · Janet B W Williams

A number of self-administered questionnaires are available for assessing depression severity, including the 9-item Patient Health Questionnaire depression module (PHQ-9). Because even briefer measures might be desirable for use in busy clinical settings or as part of comprehensive health questionnaires, we evaluated a 2-item version of the PHQ depression module, the PHQ-2. The PHQ-2 inquires ... [\[Show full abstract\]](#)

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Validation and Standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the General P...

March 2008 · Medical Care

● Bernd Löwe · Oliver Decker · Stefanie Müller · [...] · ● Philipp Yorck Herzberg

Background: The 7-item Generalized Anxiety Disorder Scale (GAD-7) is a practical self-report anxiety questionnaire that proved valid in primary care. However, the GAD-7 was not yet validated in the general population and thus far, normative data are not available. Objectives: To investigate reliability, construct validity, and factorial validity of the GAD-7 in the general population and to ... [\[Show full abstract\]](#)

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