The Psychometric Properties of the Generalized Anxiety Disorder-7 scale in Hispanic Americans with English or Spanish Language Preference

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Abstract

The Generalized Anxiety Disorder-7 scale (GAD-7) is a self-report questionnaire that is widely used to screen for anxiety. The GAD-7 has been translated into numerous languages, including Spanish. Previous studies evaluating the structural validity of the English and Spanish versions indicate a uni-dimensional factor structure in both languages. However, the psychometric properties of the Spanish language version have yet to be evaluated in samples outside of Spain, and the measure has not been tested for use among Hispanic Americans. This study evaluated the reliability, structural validity, and convergent validity of the English and Spanish language versions of the GAD-7 for Hispanic Americans in the United States. A community sample of 436 Hispanic Americans with an English ($n = 210$) or Spanish ($n = 226$) language preference completed the GAD-7. Multiple-group confirmatory factor analysis (CFA) was used to examine the goodness of fit of the uni-dimensional factor structure of the GAD-7 across language-preference groups. Results from the multiple-group CFA indicated a similar unidimensional factor structure with equivalent response patterns and item intercepts, but different variances, across language-preference groups. Internal consistency was good for both English and Spanish language-preference groups. The GAD-7 also evidenced good convergent validity as demonstrated by significant correlations in expected directions with the Perceived Stress Scale, the Patient Health Questionnaire-9, and the Physical health domain of the World Health Organization Quality of Life-BREF assessment. The uni-dimensional GAD-7 is suitable for use among Hispanic Americans with an English or Spanish language preference.

Keywords

generalized anxiety disorder; Hispanic Americans; multiple-group confirmatory factor analysis; GAD-7

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There is a paucity of research on generalized anxiety disorder (GAD) among Hispanic Americans. This may be a result of the limited number of measures that assess GAD that have been validated for use with this ethnic group. The aim of this study was to evaluate, in Hispanic Americans, the reliability, structural validity, and convergent validity of the Generalized Anxiety Disorder-7 scale (GAD-7), a screening tool that is widely used to assess for GAD.

The GAD-7 consists of seven items that query anxiety-related symptoms as experienced during the past two weeks. Original psychometric evaluation of the GAD-7 was conducted in a sample of 2,739 patients from 15 primary care sites (Spitzer, Kroenke, Williams, & Löwe, 2006). The majority of participants were female (65%), non-Hispanic White (80%), married (64%), and had attended at minimum some college (62%). Participants had a mean age of 47.4 years (SD = 15.5). Scores on the measure demonstrated good internal consistency (α = .92) and test-retest reliability (intraclass correlation = 0.83). Scores on the measure also evidenced good procedural validity; the GAD-7 self-report scale scores and GAD-7 scores derived from a clinical interview administered by a mental health professional produced similar results. Construct validity was demonstrated by the association between increasing GAD-7 severity scores and functional decline on all six Medical Outcomes Study Short-Form General Health Survey scales (SF-20; Stewart, Hays, & Ware, 1988). Convergent validity was shown by high correlations of total GAD-7 scores with scores from two other anxiety scales. Diagnostic criterion validity was evidenced by comparing GAD-7 scores to diagnoses determined by mental health professionals; at a cut point of 10 or greater, sensitivity and specificity both exceeded 0.80. Factorial validity was examined by a principal component analysis of 15 items, combining the GAD-7 and eight depression items from the PHQ-8. Two factors emerged, both with eigenvalues greater than one. All depression items had the highest factor loadings on one factor (0.58–0.75), and all anxiety items had the highest factor loadings on the second factor (0.69–0.81), indicating the GAD-7 was assessing a uni-dimensional construct distinct from depression (Spitzer et al., 2006).

The GAD-7 has been widely used (Kroenke, Spitzer, Williams, & Löwe, 2010), and has been translated into numerous languages. The Spanish language version of the GAD-7 was originally developed and validated in a sample of 212 patients of family physicians in urban areas of Spain (García-Campayo et al., 2010). Half of these patients had pre-established diagnoses of GAD while the other half served as controls. Scores from the Spanish language version showed good internal consistency reliability (α = 0.94). Mean GAD-7 scores for patients diagnosed with GAD were significantly higher than for those without a diagnosis, providing evidence of discriminative validity. Correlations between scores on the GAD-7 and all convergent validity measures (Hamilton Anxiety Scale, Hospital Anxiety and Depression Scale, World Health Organization Disability Assessment Scale) were significant and in the expected directions. Both exploratory and confirmatory factor analyses were conducted on the same sample to examine construct (structural) validity. In the exploratory factor analysis, a single factor with an eigenvalue greater than one was found, accounting for 72% of the variance in the correlation matrix. All seven items had positive loadings ≥.75 on

the factor, with individual item variances ranging from 0.58 to 0.80. In the confirmatory factor analysis, the data fit a single-factor model well (García-Campayo et al., 2010).

Four other studies have been published using the Spanish language version of the GAD-7 in cohorts in Spain (García-Campayo, Caballero, Perez, & López, 2012a; García-Campayo, Caballero, Perez, & López, 2012b; García-Campayo et al., 2012; Ruiz et al., 2011). García-Campayo et al. (2010) noted that the results of their study may be considered generalizable to the rest of Spain, but not to culturally-distinct environments outside of the country. Additionally, although the English and Spanish versions of the measure have been validated separately, no explicit test of the invariance of the dimensionality of the measure across language versions has been performed.

Given the large and growing Hispanic American population in the United States (US), a brief screening tool for GAD that has been validated in both English and Spanish is needed for this population. Studies have shown high rates of GAD among both foreign-born and US-born samples of diverse Hispanic backgrounds living in the US (Hirai, Stanley, & Novy, 2006; Street et al., 1997). For example, Street et al. (1997), using a structured interview, found that GAD was the most common psychiatric diagnosis (18%) among a diverse group of immigrants of Hispanic origin living in the US who were being treated for anxiety.

The primary purpose of the present study was to examine the internal consistency reliability and structural invariance of the English and Spanish versions of the GAD-7 for use with Hispanic Americans with English or Spanish language preference. Previous studies evaluating the GAD-7 have found a uni-dimensional factor structure. Therefore, a one-factor solution was hypothesized to fit the GAD-7 data from respondents belonging to different sociodemographic groups, who completed the scale in English or Spanish. Additionally, convergent validity for both language versions was evaluated using the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983), the Patient Health Questionnaire-9 (PHQ-9; Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999), and the Physical health subscale of the World Health Organization Quality of Life-BREF assessment (WHOQOL-BREF; Harper & Power, 1998). For both language preference groups, GAD-7 scores were expected to be strongly associated with scores from measures of similar or comorbid constructs such as perceived stress and depression, and more moderately associated with worse physical health-related quality of life.

Method

Participants

Participants were a community sample of 436 self-identified Hispanic American men and women (English language preference *n* = 210, Spanish language preference *n* = 226). To be eligible for inclusion, individuals must have self-identified as Hispanic American, been at least 21 years of age, been currently residing in the US, and been sufficiently literate in either English or Spanish so as to complete a survey packet in their preferred language. The sponsoring universities' Institutional Review Boards approved all study procedures and materials prior to human subject enrollment.

Measures

Generalized Anxiety Disorder-7 scale (GAD-7; García-Campayo et al., 2010; Spitzer et al., 2006)

The GAD-7 is a seven-item self-report measure assessing anxiety-related symptoms as defined by the *Diagnostic and Statistical Manual of Mental Disorders-IV-TR* (American Psychiatric Association, 2000). As described above, response options are on a 4-point scale (from 0 = *not at all* to 3 = *nearly every day*), and symptoms are evaluated as they have occurred over the prior two weeks. Total scores range from 0 to 21, with scores ≥5, ≥10, and ≥15 reflecting mild, moderate, and severe anxiety levels, respectively.

Perceived Stress Scale (PSS; Cohen et al., 1983)

The PSS is a self-report measure of perceived stress experienced in the last month. The 10-item version of the PSS was used in this study. Response options are on a 5-point scale (from 0 = *never* to 4 = *very often*). Total scores range from 0 to 40, with higher scores indicating greater endorsement of perceived stress. Internal consistency was acceptable for the total sample ($\alpha = 0.71$). When examined separately by language group, internal consistency was good for the Spanish language-preference group ($\alpha = 0.76$), but poor for the English language-preference group ($\alpha = 0.59$).

Patient Health Questionnaire-9 (PHQ-9; Spitzer et al., 1999)

The PHQ-9 is a widely used self-report measure of depressive symptoms. The PHQ-9 consists of nine items that parallel the diagnostic criteria for a major depressive episode as defined by the *Diagnostic and Statistical Manual of Mental Disorders-IV-TR* (American Psychiatric Association, 2000). Total scores range from 0 to 27, with higher scores indicating greater endorsement of depressive symptoms. Internal consistency reliability was good for the total sample ($\alpha = 0.90$) and for the language-preference groups (English language preference $\alpha = 0.90$; Spanish language preference $\alpha = 0.90$).

World Health Organization Quality Of Life-BREF (WHOQOL-BREF; Harper & Power, 1998)

The WHOQOL-BREF is a 26-item short form of the WHOQOL-100, a cross-culturally valid assessment of quality of life. The WHOQOL-BREF consists of four domains: physical, psychological, social, and environmental. Only the Physical health domain was used in this study. The Physical health domain asks about the respondent's pain and discomfort, energy and fatigue, sleep and rest, dependence on medication, mobility, activities of daily living, and working capacity in the past two weeks. Higher scores indicate better quality of life. Internal consistency reliability was good for the total sample ($\alpha = 0.84$) and for the separate language-preference groups (English language-preference $\alpha = 0.80$; Spanish language-preference $\alpha = 0.87$).

Procedure

The present data were collected from a cross-sectional community-based study evaluating the validity of English and Spanish language measures among Hispanic Americans. Eligible participants completed survey packets in their preferred language. Participants received $75 as a token of appreciation for their participation.

Data Analysis

Descriptive statistics were calculated for the English and Spanish language-preference groups separately. Independent samples t-tests were used to compare mean GAD-7 scores and demographic statistics across language-preference groups. Internal consistency reliability for the seven GAD-7 items was determined by computing Cronbach's alpha.

Multiple-group confirmatory factor analysis (CFA) was used to examine the goodness of fit of the hypothesized uni-dimensional factor structure of the GAD-7, and to evaluate measurement invariance across English and Spanish language-preference groups, as recommended by Dimitrov (2010). Four increasingly restrictive models were examined using the sequential constraint composition approach: 1) configural invariance, 2) metric invariance (weak measurement invariance), 3) scalar invariance (strong measurement invariance), and 4) factor variance invariance (structural invariance). Preliminary analyses revealed that the data were multivarately non-normal, therefore the maximum likelihood robust estimation procedure employed by MPlus version 7.1 (Muthén & Muthén, 2006) was used when estimating model parameters.

Multiple fit indices were jointly examined when assessing model fit. The Satorra-Bentler χ^2 (S-Bχ^2; Satorra & Bentler, 2001) was used when assessing model fit because the χ^2 maximum likelihood ratio may be inflated when the data are multivariately non-normal. In addition, due to the sensitivity of the χ^2 statistic to sample size, three descriptive indices were also evaluated: 1) the robust comparative fit index (CFI; Bentler, 1990); 2) the standardized root mean square residual (SRMR; Hu & Bentler, 1999); and 3) the root mean square error of approximation (RMSEA; Steiger, 1990). For the CFI descriptive index, values >.90 were indicative of acceptable model fit and values >.95 were indicative of good fit. For the SRMR and RMSEA fit indices, values < .08 were indicative of acceptable model fit and values < .05 were indicative of good model fit. Acceptable model fit was determined if at least two of the three descriptive fit indices met acceptable model fit criteria. When competing models were compared statistically, CFI was examined in addition to the S-Bχ^2 difference test because the S-Bχ^2 difference test is dependent on sample size (Kelloway, 1995). Using criteria previously established (Chen, 2007; Cheung & Rensvold, 2002), a non-statistically significant (p >.05) change in S-Bχ^2 value, or a change in CFI ≤.01, were indicative of no difference between nested models. Convergent validity was evaluated by examining correlations between GAD-7 total scores and total scores on the PSS, the PHQ-9, and the Physical health domain of the WHOQOL-BREF for the total sample, as well as separately for both language-preference groups.

Results

Descriptive Statistics

Sample characteristics can be found in Table 1. English language GAD-7 total scores ($M =$ 4.17, $SD = 4.64$, range: 0 - 21) were lower than Spanish language total scores ($M = 5.68$, $SD = 5.74$, range: 0 – 21), t (424) = −2.99, $p = .003$. Seventeen percent of the total sample ($n =$ 73) had total scores ≥10, indicative of moderate anxiety. Of the participants with total scores above this cutoff, 37% ($n = 27$) had an English language preference and 63% ($n = 46$)

had a Spanish language preference. As expected, language-preference groups significantly differed on many socioeconomic and demographic variables. Participants in the English language-preference group were younger, had a higher level of education, were more frequently employed, and were more frequently born in the US as opposed to Mexico, in comparison to the Spanish language-preference group. After controlling for these socioeconomic and demographic differences using hierarchical linear regression, there were no significant differences in GAD-7 scores across language-preference groups ($p = 0.15$).

Reliability

As measured by Cronbach's alpha, internal consistency reliability for the GAD-7 was strong for the total sample ($\alpha = 0.93$). Alphas were also high for the English ($\alpha = 0.91$) and Spanish ($\alpha = 0.94$) language-preference groups.

Multigroup CFA Models

Configural Invariance—Configural invariance was examined by fitting a one-factor solution to the data for the English and Spanish language-preference groups. Means, standard deviations, and ustandardized factor loadings for items can be found in Table 2. All parameters were freely estimated in these baseline models. The one-factor solution fit the data well for both groups (see Table 3). In addition, all factor loadings for both English and Spanish language-preference groups were statistically significant, providing further support for the configural invariance of the one-factor model.

Metric Invariance—Metric invariance was examined by constraining factor loadings to equivalence across the English and Spanish language-preference groups. The metric invariance model fit the data well, signifying that factor loadings were equivalent across groups (see Table 3). This constrained model was compared to the less restrictive configural invariance model. Model fit was not compromised statistically (ΔS-B$\chi^2 = 7.24$ $df = 6$, $p = 0.30$) or descriptively (ΔCFI ≤ 0.01) when factor loadings were constrained to equivalence, indicating that the metric invariance model was a superior fit to the data. Thus, weak measurement invariance was met.

Scalar Invariance—Scalar invariance was examined by constraining factor loadings and item intercepts to equivalence across language-preference groups. The scalar invariance model fit the data well, indicating that both factor loadings and item intercepts were equivalent across groups (see Table 3). This model was compared to the less restrictive metric invariance model. Results demonstrated that model fit was comprised statistically (ΔS-B$\chi^2 = 17.99$, $df = 6$, $p = 0.01$), but not descriptively (ΔCFI ≤ 0.01), indicating that the scalar invariance model was a superior fit to the data. Thus, strict measurement invariance was met.

Factor Variance Invariance—Factor loadings and factor variances were constrained to equivalence in the factor variance invariance model. This model did not fit the data well, indicating that the spread of GAD-7 scores was not the same across language-preference groups (see Table 3). Because the factor variance invariance model did not fit the data well, the metric invariance model was considered the better fit to the data.

Convergent Validity

Scores on the GAD-7 were strongly, positively, significantly correlated with scores on the PSS and PHQ-9 for the total sample, and for the English and Spanish language-preference groups separately. There were moderate, significant, negative correlations between scores on the GAD-7 and scores on the Physical health subscale of the WHOQOL-BREF for the total sample and for the English and Spanish language-preference groups separately (see Table 4).

Discussion

These findings suggest that scores on the English and Spanish language versions of the GAD-7 are reliable and structurally valid for use with Hispanic Americans. Internal consistency reliability was strong for both language groups. Results from the multiple-group CFA indicate that the GAD-7 is a structurally valid uni-dimensional measure of anxiety in both English and Spanish. All items loaded significantly onto the single factor, and loadings were strong, ranging from 0.67 to 0.89. The metric invariance and scalar invariance models fit the data well, though the factor variance invariance model did not. However, this failure to satisfy factor variance invariance does not indicate that the GAD-7 is inappropriate for use across these two language-preference groups. Rather, metric invariance is considered the critical prerequisite for valid cross-group comparison (Bollen, 1989; Cheung & Rensvold, 2002), because if this restrictive model fits the data well it can be assumed that the associations between each item and the unidimensional factor of the GAD-7 are the same irrespective of language preference. Furthermore, the lack of support for the factor variance invariance model may be reflective of differences in socioeconomic and demographic factors between the two groups.

The Spanish language-preference group had higher GAD-7 total scores and greater variability in scores in comparison to the English language-preference group. After controlling for socioeconomic and demographic differences (i.e., age, highest level of education, employment status, and country of birth), there were no significant differences in GAD-7 scores between the language-preference groups. This suggests that the differences in GAD-7 total scores found in the present study may be due, entirely or in part, to sociodemographic differences. For example, the Spanish-language group was more often foreign-born. The experiences of foreign-born individuals who immigrate and adapt to US culture are incredibly diverse, and may result in a significant level of worry and distress, or very little to none. The diversity in the immigrant experience may be reflected in the large variability in GAD-7 scores found for this group.

In addition to structural validity, the GAD-7 evidenced good convergent validity. The relationships of scores on the GAD-7 to scores on the PSS, PHQ-9, and the Physical health domain of the WHOQOL-BREF were significant, moderate to strong, and in expected directions. As anticipated, more reported anxiety symptoms were associated with more reported stress and depressive symptoms, and worse physical health-related quality of life. Furthermore, reported anxiety symptoms were more moderately associated with worse physical health-related quality of life in comparison to the stronger associations with perceived stress and depression. Perceived stress and depression are mental health constructs

that are more closely associated with worry in comparison to physical health-related quality of life, which reflects level of distress associated with physical functioning. These findings are consistent with the convergent validity analyses from the original psychometric study (Spitzer et al., 2006), in which the strongest correlations were found with the mental health subscale of the SF-20, and the weakest correlations with the physical functioning subscale.

Limitations of this study should be noted. Participants were predominantly Mexican American and were drawn from a single 5,000 square mile, border county, limiting the ability to generalize to other Hispanic American subgroups. In addition, participants did not have established diagnoses of GAD, thus preventing examination of discriminative validity. Relatedly, diagnostic interviews were not conducted, precluding any discussion of the concurrent criterion validity of the measure.

In sum, the present study provides evidence supporting the GAD-7 as a good assessment option for researchers, clinicians, and other health professionals who want a reliable and valid screening tool for GAD in English or Spanish for use with Hispanic Americans. The unidimensional GAD-7 can be reliably and validly used among Hispanic Americans with an English or Spanish language preference.

Acknowledgments

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Table 1

Sample Characteristics

	English (*n* = 210)	Spanish (*n* = 226)
Age[*][a]	38.50 (13.74)	46.24 (13.37)
Gender[b]		
Female	107 (51.0%)	112 (49.6%)
Male	103 (49.0%)	114 (50.4%)
Education[*][b]		
Less then Bachelor's degree		
Less than High School	13 (6.2%)	108 (47.7%)
High school/ Trade School	39 (18.6%)	48 (21.2%)
Some college/Associates degree	81 (38.5%)	41 (18.2%)
Bachelor's degree or higher		
Bachelor's degree	57 (27.1%)	17 (7.5%)
Postgraduate	18 (8.6%)	7 (3.1%)
Missing/Don't Know	2 (1.0%)	5 (5.3%)
Employment status[*][b]		
Employed	141 (68.1%)	106 (46.5%)
Not Employed for Wages		
Unemployed	30 (14.2%)	42 (18.6%)
Homemaker	6 (2.9%)	30 (13.3%)
Student/retired/disabled	19 (9.0%)	29 (12.7%)
Social Security/SSI	4 (1.9%)	9 (4.0%)
Missing/Don't Know	10 (3.9%)	10 (4.9%)
Marital status [b]		
Married	95 (45.2%)	116 (51.3%)
Not Married		
Single	65 (31.0%)	59 (26.1%)
Living with partner	15 (7.1%)	14 (6.2%)
Divorced/Separated	32 (15.2%)	27 (11.9%)
Widowed	3 (1.4%)	9 (4.0%)
Missing	0 (0.0%)	1 (0.5%)
Country of birth[*][b]		
United States	130 (62.5%)	31 (13.6%)
Mexico	52 (24.8%)	135 (57.8%)
Other	9 (4.5%)	4 (1.7%)
Missing	19 (8.2%)	56 (26.9%)
Children[b]		
Yes	113 (56.2%)	122 (63.5%)
No	88 (43.8%)	65 (33.9%)
Missing	0 (0.0%)	5 (2.6%)

Note.

[a]M (SD);

[b]n (%).

[*] Independent sample t-tests resulted in a significant difference at $p < .01$ (two-tailed) between language-preference groups.

Table 2

Means, Standard Deviations, and Unstandardized Factor Loadings From Baseline Models for English and Spanish language versions of the GAD-7

GAD-7 item	Factor loadings	
	English (n = 210)	Spanish (n = 226)
1. Feeling nervous, anxious or on edge	1.00[*]	1.00[*]
2. Not being able to stop or control worrying	1.17[*]	1.05[*]
3. Worrying too much about different things	1.27[*]	1.21[*]
4. Trouble relaxing	1.29[*]	1.18[*]
5. Being too restless that it is hard to sit still	1.03[*]	1.17[*]
6. Becoming easily annoyed or irritated	1.04[*]	1.02[*]
7. Feeling afraid as if something awful might happen	1.01[*]	0.80[*]

Note. The factor loading for the first item was fixed to 1 to set the metric for the latent variable.

[*] p < .05.

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Table 3

Fit Statistics for Configural Invariance, Metric Invariance, Scalar Invariance, and Factor Variance Invariance Models of the GAD-7

Model	S-Bχ^2	df	p	CFI[a]	SRMR[b]	RMSEA[b]	Reference Model #	ΔS-Bχ^2	Δdf	Δp	ΔCFI
1. Configural	86.58	28	<.01	0.951	0.038	0.098					
2. Metric	94.83	34	<.01	0.950	0.048	0.091	1	7.24	6	0.30	0.001
3. Scalar	112.70	40	<.01	0.940	0.053	0.091	2	17.99	6	0.01	0.010
4. Factor	102.03	35	<.01	0.944	0.103	0.094	2	24.05	1	<.01	0.006

Note. CFI = robust comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation.

[a]Plausible fit > .90, Good fit >.95.

[b]Plausible fit < .08, Good fit < .05.

Table 4

Correlations between total scores on the GAD-7 and the PSS, PHQ-9, and WHOQOL-BREF

	GAD-7 Total Sample	GAD-7 English Language Preference ($n = 210$)	GAD-7 Spanish Language Preference ($n = 226$)
PSS	0.67, $p < .01$	0.71, $p < .01$	0.66, $p < .01$
PHQ-9	0.78, $p < .01$	0.80, $p < .01$	0.70, $p < .01$
WHOQOL-BREF (Physical Health subscale)	−0.34, $p < .01$	−0.41, $p < .01$	−0.31, $p < .01$

Note. Values are presented as *r*.