

Psychometric Properties of the DASS-21 Among Latina/o College Students by the US-Mexico Border

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Abstract Anxious-depression symptomatology is frequently encountered among Latina/o individuals. There is a dearth of studies that examine this mixed class of anxiety and depression symptomatology, especially among Latina/o college students by the US-Mexico border. A total of 505 participants from rural institutions of higher education completed the DASS21. Psychometric properties were measured by means of confirmatory and exploratory factor analysis (EFA). A multivariate analysis of variance (MANOVA) was conducted to determine gender differences in depression, anxiety and stress. Among women, 18 % reported at least moderate levels of depressive symptoms, 33.1 % reported at least moderate levels of anxiety symptoms, and 16.4 % reported at least moderate levels of stress. In men, 15.9 % reported at least moderate levels of depressive symptoms, 34.1 % reported at least moderate levels of anxiety symptoms, and 12.9 % reported at least moderate levels of stress. The EFA supported a one dimension factor (anxious/stress-depression) among this sample of Latina/o college students (Bartlett's test = 4960.9; $df = 210$; $p \leq 0.01$; Kaiser–Meyer–Olkin = 0.95). The MANOVA found no significant gender differences in depression, anxiety symptomatology and stress [Wilks' $\Lambda = 0.99$; $F = (3, 500) = 2.41$; $p = 0.07$]. The DASS-21 showed a one dimensional construct of anxious/stress-depression symptomatology in a Latina/o rural

undergraduate sample, raising awareness to the need to screen and monitor this constellation of symptoms.

Keywords Latino/a college student · Anxious-depression · Screening · DASS-21

Introduction

Studies have reported that some Latina/os present with mixed anxious-depression symptomatology which have been frequently associated with social factors that manifest with episodes of severe anxiety and depression, or stress/nerves (“nervios”) [1, 2]. A recent study among Latina/os of different backgrounds in the United States reported a 30 % prevalence of moderate anxious-depression symptomatology [3]. Despite this considerable prevalence of anxious-depression symptomatology, there continues to be controversy in this construct due to the heterogeneity of the diagnostic definition [4, 5], especially among Latina/os. According to the 5th edition of the diagnostic and statistical manual of mental disorders (DSM-5), anxious-depression refers to a major depressive episode with an added specifier of anxiety symptoms [6]. Other studies have reported anxious-depression as a major depressive episode with a high score in the anxiety/somatization items of the Hamilton Depression rating scale [7, 8]. Stress, anxiety and depression are core symptoms of affective disorders. The spectrum of affective and anxious symptomatology is quite prevalent in the general population [9, 10] and college students [11]. Attempts to subtype anxiety and depression symptoms have resulted in minimal success and have revealed mixed classes [12]. There is a dearth in the literature of studies examining this construct of anxious-depression symptomatology among Latina/os attending

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higher education in underserved communities, especially by the US-Mexico border.

The 21-item Depression Anxiety Stress Scales (DASS21) is the brief version of the original 42-item DASS [13]. The DASS was initially developed as a thorough measure of symptoms that are distinctive of depression and anxiety in order to maximize discrimination between these two phenomena. The decision to include the stress scale in the DASS was made after observation that some items assessed for physical experiences that are reflective of tension, such as difficulty relaxing. The original DASS was standardized within college students. Similar factor structures for the DASS have been found between women and men [13]. Items that comprise the DASS21 are the seven items that have the highest factor loadings on the original depression, anxiety, and stress dimensions of the DASS.

The underlying factor structure of the DASS and the DASS21 has received much empirical attention. Researchers have examined the psychometric properties of the DASS and the DASS21 in clinical samples [14–19] and nonclinical samples [20–34], with studies that have compared clinical to nonclinical samples finding similar factor structures [13, 16]. Many studies support the original DASS/DASS21 model or a modified three-factor model using confirmatory factor analysis or Rasch model analysis [14–19, 24, 29, 31, 32], although some studies have found high intercorrelations among the scales or have had to allow correlated error terms to produce adequate model fit. Other studies have uncovered that different factor structures fit the DASS/DASS21 data from their samples [28].

One alternative factor structure is a tripartite model that contains a second-order factor considered to be negative affectivity or a general-distress dimension that underlies the depression, anxiety, and stress constructs [27, 34]. A study of the DASS21 among college students in the United States supported the notion of the quadripartite and four-factor model in addition to the three factor solution [21]. In another nonclinical sample of US adults, principal components analysis of one half of the data resulted in the extraction of one factor whereas a confirmatory factory factor analysis on the other half of the data supported a three-factor structure to the DASS21 [26]. As Gomez et al. note [29], several researchers have treated the items of the DASS/DASS21 as continuous despite the categorical/ordinal nature of the response options; this can result in inadequate parameter estimates. Recent studies that have treated the DASS21 data as categorical [24, 29] support an oblique three-factor structure to the DASS21.

Although studies of the DASS21 have utilized samples from around the world, research about the DASS21's factor structure in Latina/os remains in its infancy. Studies have reported gender differences in stress, anxiety and

depression among Latinos [35], thus to be consistent with existing literature, we will continue to address Latina/o throughout the manuscript. An investigation of the psychometric properties of the DASS in Brazilian Portuguese resulted in a three-factor model with a few items failing to load on their original factors [19], whereas examinations of the DASS21 in European Portuguese did not support the three-factor structure [36, 37]. However, a three-factor structure to the DASS21 was found among Chilean adolescents and college students [32, 38] and among Spanish college students [39, 40], although not for the original DASS among Spanish college students [39]. Daza et al. [41] investigated the psychometric properties of a Spanish translation of the DASS21 among Latina/o adults with anxiety disorders from Texas. The DASS21 scales were highly intercorrelated, and a second-order factor model fit the data almost identically to a first-order structure comprised of three factors, lending support to an underlying anxious-depression dimension to depression, anxiety, and stress [5].

Regarding Latina/o college students in the United States, Norton [24] uncovered a three-factor structure to the DASS21 across a multiethnic sample that included Latina/o college students but also found that factor covariances among the four ethnic groups studied were not invariant which suggests that depression, anxiety, and stress are related differently among ethnic groups. The few but mixed results about the DASS21 pertinent to Latina/o college students in the United States render further study of the factor structure of the DASS21 in this population is needed given the importance of valid and reliable assessments of symptoms that could be clinically relevant and the evidence for an anxiety-depression construct among Latina/os that would result in a different factor structure to the DASS21.

To our knowledge, few studies have reported and evaluated psychometric properties of scales screening for symptoms of anxious-depression among Latina/o students attending rural colleges and universities. Latina/os have shown higher levels of combined depressive and anxiety symptoms when facing new environments, such as entering higher education [42–44], thus we were interested in studying the prevalence of symptoms of depression, anxiety, and stress among Latina/o students attending rural institutions of higher education. Our first aim was to study the psychometric properties of the DASS21 among a sample of Latina/o college students attending rural schools. We first hypothesized that the DASS21 would show adequate psychometric properties within the studied Latina/o college population. Our second aim was to determine whether or not there were gender differences in the distribution of depression, anxiety, and stress symptoms among Latina/os attending these schools. Our third aim

was to evaluate if there were any gender differences in the anxious-depression construct among Latina/os as measured by the DASS21.

Methods

Population Characteristics

The sample consisted of 505 participants who self-reported as Chicano/Latino/Hispanic-American descent. Participants were recruited through convenience sampling on three college and university campuses within rural locations of southeastern California. Within the category of background, the participants were: Mexican (65.7 %), Puerto Rican (0.8 %), Cuban (0.4 %), Spanish (0.8 %), South American (2.4 %), Mixed Latino (0.8 %), and 29.1 % of the participants were undefined within a subcategory of Chicano/Latino/Hispanic-American descent. Of the 505 participants, 372 were female (73.7%), 132 were male (26.1 %), and 1 participant did not disclose gender. The average age in this sample was 23.92 years ($SD = 6.27$).

Instruments

The 21-item Depression, Anxiety, and Stress scale (DASS21; Lovibond and Lovibond [13])

The 21-item version of the Depression, Anxiety, and Stress Scale has 7 items measuring depression, 7 items measuring anxiety, and 7 items measuring stress. Participants answered on a 4-point Likert scale; 0 = did not apply to me at all, 3 = applied to me very much, or most of the time, within the last week. A sample item from the depression subscale is: “I couldn’t seem to experience any positive feeling at all”. A sample item from the anxiety subscale is: “I was worried about situations in which I might panic and make a fool of myself”. A sample item from the stress subscale is: “I found it hard to wind down”.

Procedure

Participants were recruited by convenience sampling via in-class announcements by a student researcher or by instructors. Participants were students at one of three campuses: (1) San Diego State University, Imperial Valley, (2) Imperial Valley College or (3) Palo Verde College. All three of the campuses are located in rural areas of southeastern California near the US-Mexico border and the California-Arizona border. The participants read a consent form and either signed or checked a box that they understood what was being presented in the following surveys.

The student researcher collecting the surveys also signed the consent form. The participants were told to contact the researcher or faculty mentor for any questions, comments or concerns. Participation in the surveys was completely voluntary and the participants had the option to discontinue at any time. All the surveys had been approved by the host university’s IRB prior to data collection.

Statistical Analyses

Continuous variables were described by means and standard deviations (SD), and categorical variables were described as frequencies where applicable. A multivariate analysis of variance (MANOVA) was conducted to investigate center effects and to determine significant differences of DASS21 scores on depression, anxiety and stress by gender, with alpha set at 0.05.

Exploratory and confirmatory factor analyses were performed to determine the factor structure of the DASS21 results among this sample and to examine if there were salient factors that would imply an anxious-depression dimensional construct. IBM SPSS, IBM SPSS Amos Graphics (version 20), and FACTOR software (<http://psico.fcep.urv.es/utilitats/factor/>) were used for the analyses [45].

Results

A MANOVA found significant differences by school, Wilks’ $\Lambda = 0.94$, $F(6, 994) = 5.16$, $p < 0.01$. Follow-up analyses of variances (ANOVA) for depression, anxiety, and stress were conducted. The ANOVA on depression was significant, $F(2, 499) = 8.55$, $p < 0.01$. Pairwise comparisons revealed that participants from School 3 ($n = 7$) had significantly higher depression ($M = 1.29$, $SD = 0.79$) than participants from School 1 ($n = 320$; $M = 0.42$, $SD = 0.55$) and School 2 ($n = 175$; $M = 0.51$, $SD = 0.61$). Additionally, the ANOVA for anxiety was significant, $F(2, 499) = 9.25$, $p < 0.01$. According to pairwise comparisons, significant differences were found among participants from School 1 ($M = 0.50$, $SD = 0.56$), School 2 ($M = 0.66$, $SD = 0.63$) and School 3 ($M = 1.29$, $SD = 0.67$).

Table 1 presents participants’ total DASS21 subscale scores within gender and by severity category [13]. Among women, 18 % reported at least moderate levels of depressive symptoms, 33.1 % reported at least moderate levels of anxiety symptoms, and 16.4 % reported at least moderate levels of stress. In men, 15.9 % reported at least moderate levels of depressive symptoms, 34.1 % reported at least moderate levels of anxiety symptoms, and 12.9 % reported at least moderate levels of stress. The MANOVA found no

Table 1 Score distribution for the 21-item Depression, Anxiety, and Stress Scale by gender and severity

DASS21 subscale	Normal (%)	Mild (%)	Moderate (%)	Severe (%)	Very severe (%)
<i>Depression</i>					
Women	74.7	7.3	10.2	3.2	4.6
Men	75.8	8.3	10.6	0.8	4.5
<i>Anxiety</i>					
Women	57.0	9.9	14.8	5.7	12.6
Men	62.9	3.0	24.3	3.0	6.8
<i>Stress</i>					
Women	72.8	10.8	7.3	6.9	2.2
Men	80.3	6.8	5.3	2.3	5.3

DASS21 Depression, Anxiety, and Stress Scale, 21-item version

significant gender differences in depression, anxiety, and stress, Wilks' $\Lambda = 0.99$, $F(3,500) = 2.41$, $p = 0.07$.

A Confirmatory Factor Analysis (CFA) using Bayesian Estimation for ordered-categorical data was attempted using IBM SPSS Amos Graphics (version 20) software to test the original DASS21 model [13] within this study's Latina/o sample. However, the model failed to achieve convergence. Therefore, the dimensions of the DASS21 items were examined using exploratory factor analysis (EFA) for ordinal data with FACTOR software (<http://psico.fcep.urv.es/utilitats/factor/>, Lorenzo-Seva and Ferrando [45]). Parallel analyses based on Minimum Rank Factor Analysis (PA-MRFA) and polychoric correlations were used to determine factor retention. Mardia's [46] test for multivariate asymmetry skewness and kurtosis indicated no skewness ($p = 1.00$) but significant kurtosis ($p = < 0.01$) thus the use of polychoric correlations was supported [47]. The polychoric correlation matrix resulted in a significant Bartlett's test [statistic = 4960.9, ($df = 210$), $p = < 0.01$] as well as a significant Kaiser–Meyer–Olkin (KMO) statistic of 0.95, reflecting a good model fit. PA-MRFA bases recommendations about factor retention on random explained common variance instead of eigenvalues [47]. Only one factor's real-data percentage of variance explained (53.5 %) met two different criteria used for factor retention in PA-MRFA by exceeding both the mean of random percentage of variance extracted (9.7 %) and the 95th percentile of random percentage of variance (10.7 %), thus retention of only one factor was advised.

Minimum Average Partial (MAP) with MRFA option for extraction was used to extract one factor from the DASS21 data. In the absence of the extraction of more than one factor, no factor rotation was conducted. The percentage of the factor's explained common variance was 65.16 % and all items' communalities were above 0.40. The Mislevy and Bock estimate for the factor ($\alpha = 1.00$) and McDonald's Omega (statistic = 0.95) indicate adequate reliability. Item characteristics, the factor loadings, and communalities for the DASS21 items are presented in

Table 2. A t test was conducted on scores from the extracted factor between female participants ($M = -0.04$, $SD = 1.03$) and male participants ($M = 0.11$, $SD = 0.90$). The t -test was not significant, $t(502) = -1.51$, $p = 0.13$.

Discussion

The present cross-sectional study reported some psychometric properties of the DASS21 administered to Latina/o college students attending schools in a rural area by the US-Mexico border. The sample showed adequate reliability. The CFA failed to show convergence thus it was necessary to explore the dimensions of the DASS21 using exploratory factor analysis for ordinal data. The results of the exploratory factor analysis advised the retention of only one factor, pointing towards a unified construct of anxiety-depression-stress, or what the literature has alluded to as dimensional anxious-depression symptomatology [5].

With Latina/os being one of the fastest growing minorities in the United States [48] it is important to study and understand the culture that is accompanying this population and their attendance in higher education. One such culturally relevant concept that could help understand distress in Latina/o college students is "nervios". In English, this is described as a state of anxiety and dysphoria caused by external stressors and has been well described in the literature [49, 50]. Furthermore, the DSM-5 has a new specifier of "anxious distress" that alludes to the overlapping nature of anxiety within a depressive disorder [51]. Although our study did not study diagnosis of major depression with concurrent anxious symptomatology, the importance of an anxious-depression symptomatology spectrum among this Latina/o college population is worthy of clinical attention to monitor and ameliorate any social and academic impairment. The one-factor anxious-depression construct found in this study may lead to further exploration of this scale in other Latina/o samples of

Table 2 Item characteristics, factor loadings, and communalities for the 21-item Depression Anxiety and Stress Scales

Item	Mean	Confidence interval (95 %)	Variance	Skewness	Kurtosis (zero-centered)	Factor 1 loading	Communality
1	0.79	0.69, 0.90	0.82	0.87	-0.28	0.49	0.74
2	0.82	0.71, 0.93	0.93	0.91	-0.30	0.40	0.59
3	0.53	0.44, 0.62	0.65	1.40	1.04	0.65	0.65
4	0.52	0.43, 0.61	0.68	1.51	1.39	0.64	0.64
5	0.74	0.64, 0.84	0.76	0.98	0.08	0.59	0.70
6	1.03	0.92, 1.14	0.89	0.59	-0.58	0.64	0.69
7	0.51	0.41, 0.60	0.71	1.61	1.61	0.65	0.80
8	0.69	0.59, 0.80	0.85	1.15	0.25	0.78	0.86
9	0.80	0.69, 0.91	0.94	0.94	-0.26	0.76	0.83
10	0.41	0.32, 0.50	0.61	1.97	3.07	0.77	0.87
11	0.77	0.66, 0.87	0.86	1.01	0.01	0.79	0.89
12	0.82	0.72, 0.93	0.89	0.91	-0.21	0.72	0.78
13	0.53	0.43, 0.62	0.69	1.52	1.44	0.77	0.75
14	0.63	0.53, 0.72	0.71	1.19	0.53	0.74	0.69
15	0.42	0.33, 0.51	0.63	1.97	3.09	0.83	0.91
16	0.42	0.33, 0.50	0.57	1.89	2.93	0.84	0.89
17	0.34	0.25, 0.43	0.58	2.30	4.36	0.86	1.00
18	0.59	0.49, 0.69	0.71	1.31	0.84	0.68	0.66
19	0.50	0.40, 0.60	0.72	1.67	1.78	0.71	0.78
20	0.43	0.34, 0.52	0.63	1.89	2.72	0.77	0.92
21	0.31	0.23, 0.39	0.50	2.39	4.95	0.82	1.00

different backgrounds to accurately measure this constellation of symptoms and serve as a predictor of future impairment. Such studies would aid in identification of this specific and common construct and might have applications in outcome measurements conducted in population and clinical studies.

Another interesting finding is that we did not find any gender differences in anxious-depression symptomatology. The literature has reported that Latina/os have different approaches on how to handle stress and immigration based on culturally-bounded concepts of “marianismo”, for Latinas and “machismo” for Latinos [35, 52]. Traditionally, Latinas are socially allowed to be emotional and more open to expression of negative emotions and distress, which is in line with the *marianismo* construct. Conversely, Latinos are encouraged by the *machismo* construct to withhold emotions and project anxiety and depressed via somatic symptoms, making it difficult to open up and receive interventions [53]. Our findings suggest that, among this sample of Latina/o rural college students, the expression of stress and anxious-depression symptomatology is consistent and equivalent among gender. The fact that we did not find any gender differences in our population could represent a homogeneous expression of anxious-depression symptomatology in this rural college sample. Further studies on anxious-

depression symptomatology, psychosocial stressors and gender differences are needed among Latina/os living in different geographical regions of the US.

As noted by the DSM-5, the anxiety and depressive symptoms among Latina/os from different backgrounds presents with such variability that this construct has been considered an important cross-cultural psychiatric phenomenon that requires more research [54]. A recent cross-sectional study by Alcántara et al. [55], found useful to discuss “padecer de nervios” with immigrant women as a gateway to introduce the described diagnosis of anxiety and depression within the DSM nomenclature. In the present cross-sectional study, large numbers of each gender reported at least moderate levels of depression, anxiety and stress which suggests a significant portion of Latina/o college students may have relevant symptoms that have not been identified and could interfere with their functioning. These findings emphasize the importance of screening for anxious-depression symptomatology in colleges and universities and provide early treatment and follow up to avoid deterioration of their academic and social functioning and worsening of symptoms.

The strong association between anxiety and stress with depression emphasizes the need for measuring and screening for the anxious-depression construct. The clinical importance of screening for anxious depression symptomatology

has been well described in the literature. In a recent report from the World Health Organization World Mental Health Surveys found that 68 % of individuals have an anxiety disorder before progressing into a depressive condition [56]. Anxious-depression symptomatology is highly prevalent in community settings, associated with worse prognosis and other medical comorbidities [57–59]. Early identification of this anxious-depression symptomatology is crucial for preventive interventions and treatment if clinically indicated. According to the literature, higher levels of anxiety are more frequently associated with suicide and impulsivity compared to depressive symptoms [58, 60, 61]. This information could be helpful in training clinicians and school officials to be aware of the similarities and differences between and within depression, anxiety and stress when screening, and be prepared to readily identify students with high levels of anxious-depression to promptly refer them for behavioral health support and treatment.

Limitations pertain to the nature of the sample and the analyses conducted. It is a cross-sectional study and only the factor structure of the DASS21 was examined. Construct validity or test–retest reliability were not assessed. All participants were considered one “Latina/o” group despite the heterogeneity in the Latina/o subgroups with which participants self-identified. There were significant center effects in depression and anxiety among the sample. However, all participants were included into the sample because differences in rates neither imply corresponding differences in psychometric properties of the DASS21 nor differences in the nature of anxiety-depression as a construct. Additionally we did not collect data to control for confounding factors such as socio-economic status and family/personal stressors. Conversely, the study has the strength of assessing the psychometric properties of a scale used to measure symptoms of anxiety and depression in a rural Latina/o college population by the US-Mexico border. Even though our study utilized a sample of convenience, our sample presents important data from Latina/o rural college students living in southern California by the US-Mexico border.

In conclusion, the DASS21 showed a dimensional construct of an anxious-depression symptomatology and the lack of gender differences in Latina/o rural college students by the US-Mexico border. These data provide evidence about the importance of screening carefully for this constellation of symptoms among this population. Future studies should look at the longitudinal properties of the DASS21 for test–retest reliability, as well as construct validity with anxiety and depression scales frequently used in clinical practice.

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