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Anxious-Depression among Hispanic/Latinos from different backgrounds: Results from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)

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Abstract

Background—Anxious-depression is a constellation of symptoms, frequently encountered among patients in primary care centers. There is a need to study how anxious-depression presents among Hispanic/Latinos of different backgrounds.

Objective—To study the construct of anxious-depression among 16,064 Hispanic/Latinos of different backgrounds participating in the Hispanic Community Health Study/ Study of Latinos (HCHS/SOL). We hypothesized that Hispanic/Latinos will cluster in 3 classes: low anxiety/high depression, high anxiety/low depression and a combined anxious-depression construct.

Methods—Using latent profile analysis, symptoms of depression and anxiety measured by the 10-item Center for Epidemiologic Studies Depression Scale (CES-D) and 10-item State-Trait Anxiety Inventory (STAI) were evaluated to determine if an anxious-depression typology would result. A multinomial logistic regression analysis explored the association of the 3-class solution with different Hispanic/Latino backgrounds controlling for age, gender, language, education and income.

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Results—A 3-class mixed anxious-depression structure emerged with 10% of Hispanic/Latinos in the high, 30% in the moderate and 60% in the low anxious-depression category. After adjusting for age, gender, language preference, income and education, individuals of Puerto-Rican background were more likely to experience high (OR=1.79,$p<0.05$) and moderate (OR=1.36,$p<0.05$) (vs.low) anxious-depression symptomatology compared to those of Mexican background. Individuals of Central-American and South-American background were less likely to experience high (OR=0.68,$p<0.05$) and moderate (OR=0.8,$p<0.05$) (vs.low) anxious-depression compared to those of Mexican background.

Conclusion—Anxious-depression symptomatology varied among this sample of Hispanic/Latino groups. These classes should be investigated as to their relationship with different health outcomes relevant to the Hispanic/Latino of different backgrounds.

Introduction

Anxious-depression has been considered a controversial nosological construct and has several definitions in the psychiatric literature [1,2]. The literature reports that patients can manifest symptoms of depression and anxiety in different ways. Since the early 1990s, Clayton and colleagues characterized anxious-depression as a severe form of a major depression disorder with anxiety features [3,4]. It is also known that anxiety symptoms, in the context of a major depressive disorder, have been associated with higher disability, poor response to established treatments, and higher rates of suicide [5–9].

Even though anxious-depression was not considered as a formal diagnosis in the revised 5th version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), authors agreed that depressive disorders should include the category of anxious distress [10,11]. Comorbid anxiety and depressive symptoms, outside from the classic diagnostic definition, have gained attention of researchers, and clinicians attest that is a condition frequently observed among patients, especially in community health centers [12]. This construct was further validated by the work of Katon and colleagues who showed that anxious-depression states are commonly seen in primary care settings and are usually associated with chronic medical comorbidities such as diabetes [13]. Attempts to subtype coexisting anxiety and depression have resulted in minimal success due to heterogeneity and severity of the symptoms [14]. Experts agree that anxious-depression is a spectrum of symptoms that deserves more consistent research due to its high prevalence in clinical settings [15,16,14,17].

In fact, a recent review considered anxious-depression as a constellation of anxiety and depressive symptoms that do not meet criteria for a major depressive or an anxiety disorder as defined by the DSM [18] [17]. Little research has been done in this particular definition of anxious-depression [17]. Studies that have looked at this construct, derived the definition of anxious-depression from latent factors extracted from scales that measure symptoms of anxiety and depression separately such as the Hamilton Anxiety and Depression Rating Scale [18]. Clinical observations have suggested that symptoms of anxiety and depression or anxious-depression are related and often co-occur [19,20,1,21]. In order to advance the literature on this nosological controversy, it is important to rely on epidemiological studies

where symptoms of anxiety and depression are measured with standardized scales and patterns of symptoms could be observed cross-sectionally and over time.

According to Fava et al. the sociodemographic features associated with anxious-depression include individuals of older age, female, less educated and unemployed [7]. This characteristic could be applied to individuals from different ethnic backgrounds. Hispanic/Latinos are one of the largest minority ethnic group in the United States and face considerable mental health disparities compared to Non-Latino Whites [22,23]. Hispanic/Latinos in the United States are this heterogeneous group from different nationalities in which expression of emotions varied according to their region of origin. For example, reports have documented that prevalence of anxiety symptoms are higher among Puerto Ricans compared to Mexicans or individuals from South America [24–26]. Previous literature has shown that Hispanic/Latino individuals frequently present with mixed symptoms of anxiety and depression, which have been associated with low education, financial stress and chronic medical conditions [27]. This constellation of anxiety and depressive symptoms among Hispanic/Latinos from different backgrounds presents with such variability that has been considered an important cross-cultural psychiatric aspect that requires more research as noted by the DSM-5 [25]. Furthermore, there is a deficiency of studies examining this mixed class of anxiety and depressive symptomatology among Hispanics/Latinos of different backgrounds.

In order to study this construct of anxious-depression symptomatology we used latent profile analyses to examine whether anxiety and depressive symptoms as measured by validated scales overlap or were independent from each other in a large epidemiological study of Hispanic/Latinos. Our hypothesis uses the tripartite theory of Clark and Watson which has considered anxious depression as an orthogonal constellation of positive affectivity, hyperarousal and negative affectivity which has been used in empirical research as dichotomous construct (high anxiety and low depressive symptoms) [12,20]. Based on this rationale, we first hypothesized that Hispanic/Latino individuals of diverse backgrounds would cluster in 3 distinct classes of item groupings: a high anxiety/low depression group, a high depression/low anxiety group and a group with similar levels of anxiety and depression. Secondly, we hypothesized that Hispanic/Latino individuals would differ in the clustering of symptoms of anxious-depression by background of origin which has been described in the literature [28]. This approach served as an initial step to further study the construct of anxious-depression symptomatology among individuals from diverse Hispanic/Latino backgrounds [29,28].

Methods

Study Population

This study used baseline data from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). Briefly, HCHS/SOL is a multisite cohort study with the objective of identifying risk and protective factors for chronic disease among diverse Hispanic/Latino background groups living across the United States. The cohort included 16,415 men and women between 18 to 74 years of age at the time of recruitment. Participants were recruited from 2008 until 2011 from randomly selected households from 4 communities in the United

States (San Diego, CA; Bronx, NY; Chicago, IL; Miami, FL). The HCHS/SOL included first through third generation participants of Mexican, Cuban, Puerto Rican, Dominican Republic, Central and South-American background. Details of the study design and sampling methods are published elsewhere [30,31].

Data Collection

Census block groups were randomly selected in the participating field centers and households were randomly selected in each sample block group [30,32,31]. Standardized questionnaires were used to collect socio-demographic, Hispanic/Latino background and health information [31,30].

Measures of Depressive and Anxiety Symptoms

Depressive symptoms were measured with the Andresen version of the Center for Epidemiological Studies-Depression Scale (CES-D) which has a good predictive accuracy (k=0.97) when compared to the full 20-item version [33]. This 10-item scale assesses depressive symptoms over the past week. Respondents were asked to indicate on a scale from 0 (rarely or none of the time) to 3 (all of the time) how often they experience symptoms related to depression (e.g., I felt everything I did was an effort). The scale has a sensitivity of 97% and specificity of 84% to screen for depressive symptoms [34]. Internal consistency for the current sample was (α =0.82).

Anxiety symptoms were measured as a state with the 10-item State Trait Anxiety Inventory. Respondents were asked to indicate on a scale from 1 (almost never) to 4 (almost always) how often they experienced symptoms related to anxiety also over the last week (e.g., I feel nervous and restless). High scores reflect increased symptoms of anxiety. Internal consistency for the current sample was (α=0.81).

Other Demographics

Self-reported information on socio-demographic characteristics was obtained. These included age, gender, language of preference, socioeconomic status categorized in four distinct groups based on annual income (<$20,000; $20,001–50,000; >$50,000; unreported) and level of education categorized as <high school; high school graduate and >high school [31].

Hispanic/Latino Background

Information on Hispanic/Latino background was based on the question: “Which of the following best describes your Hispanic/Latino heritage (Dominican or Dominican descent, Central-American or Central-American descent, Cuban or Cuban descent, Mexican or Mexican descent, Puerto Rican or Puerto Rican descent, South-American or South-American descent, More than one heritage, Other)?”.

Statistical Methods

Continuous variables were described by means/standard errors (SE) and categorical variables as frequencies/percentages. Data were weighed to adjust for sampling probability and non-response [32,31,30].

Latent profile analysis (LPA) was used to identify group of individuals with similar anxiety and depressive symptoms and classify them into latent classes based on their similar symptoms [35,36,21]. LPA categorized individuals on the basis of their responses to the items on the CES-D and STAI. Variables used in the LPA included all observed continuous items from the CES-D and STAI. LPA not only allows the classification of participants into mutually exclusive classes, but provides each individual with its own set of symptom endorsement probabilities for each class [36,37,21]. The best-fitting model was selected based on the Akaike information criteria (AIC), Bayesian information criteria (BIC), sample sized adjusted Bayesian information criteria (sBIC), Entropy and bootstrapped likelihood ratio test (LRT) [37,38]. While there is evidence supporting the use of BIC as the recommended indicator to determine model fit, there is controversy in this topic and few simulation studies have been conducted on the indices used to determine the best fitting models for LPA [38]. Recent studies have suggested that the sBIC is the most accurate tool for deciding on the number of classes [39,40]. Based on the literature, we also considered the best model and interpretability of the classes based on the context, theory and hypothesis generated *a priori* [41,37].

The different classes generated were used to examine the hypothesis that a pure anxiety group, a pure depression group and a group with mixed anxiety and depressive symptoms would emerge from the CES-D and STAI items based on the tripartite theory of positive affectivity, hyperarousal and negative affectivity (3-Classes). Latent profile analysis for this study, due to the large size, allowed for the observation and classification of different homogenous groups [37].

Individuals were assigned to the latent class with the highest and most interpretable posterior probability as well as the previously outlined indicators to determine model fit. A multinomial logistic regression analysis was used to determine the association of the different classes of anxious-depression with the different Hispanic/Latino backgrounds after controlling for age, gender, language of preference, level of education and income. All analyses were done using MPlus version 7.3.

Results

Symptoms of depression and anxiety were analyzed based on data from a total of 16,064 participants from the HCHS/SOL. At baseline, the mean age of the target population was about 41years and about half were women. Thirty nine percent had greater than high school education and 46% reported an annual income of <$20,000. The reference population of Mexican background (37%) compromised the largest group, followed by those of Cuban (20%) and Puerto-Rican backgrounds (16%). The mean CES-D was 7.9 (SE=0.1) among women and 6.0 (SE=0.1) among men. The mean STAI was 17.8 (SE=0.1) among women and 16.2 (SE=0.09) among men. Table 1 summarizes these characteristics.

Classes of Anxious-Depression Symptomatology

Five class models are presented in Table 2. AIC, BIC and sBIC indices decreased as the number of cluster extracted decreased suggesting that the number of clusters fit the models progressively following statistical parsimony criteria. Indices for a 3 and 4- class model fit

were very similar. A 4-class solution showed the lowest BIC and sBIC, yet the posterior probabilities were not as readily interpretable as the 3-class solution. As described in the literature, we used not only the best fitting indices but also the context and theory used to generate the hypothesis [38,39,41]. Classification quality as measured by Entropy, which estimates classification uncertainty was around 0.90 for the classes of interest (3 and 4) which indicates low uncertainty in classification of classes [42,37]. Based on all these criteria, we selected a 3-class solution as the best fitting model. This 3-class solution supports our cited tripartite theory of anxious-depression (hyperarousal, positive and negative affect) [20].

Contrary to our first hypothesis that three subgroups representing high depression/low anxiety, high anxiety/low depression and mixed levels of anxiety/depression symptoms will emerge, the most interpretable result from the LPA was a 3-class model of (percentages rounded-up): Class 1: a high anxious-depressed group (10% of sample), Class 2: a moderate anxious-depressed group (30% of sample) and Class 3: a low anxious-depressed group (60% of the target population of sample), suggesting a spectrum of mixed anxious-depression symptomatology. Table 2 summarizes the 5 extracted classes with the different fit indices. Figure 1 illustrates the anxious-depression spectrum of 3-classes obtained based on the mean values of the variables across the three latent classes. Table 3 presents stratification of socio-demographic factors among the 3 obtained latent classes of anxious-depression.

Differences between Hispanic/Latino background and anxious-depression classes

Multinomial logistic regression analysis showed a significant difference in the class of anxious-depression present across Hispanic/Latino backgrounds groups after controlling for age, gender, language of preference, education and income. Individuals of Mexican background were the largest group, and thus were used as the reference group for all comparisons. In order to facilitate the interpretation of the findings, the low anxious-depression group was included as the reference class. For these analyses, the different Hispanic/Latino background groups predicted the latent outcome variable anxious-depression.

Puerto Rican Background—These participants were more likely to show high (vs.low) (OR=1.79; 95%CI:1.48,2.16) and moderate (OR=1.36;95%CI:1.19,1.56) (vs. low) anxious-depression symptomatology compared to those of Mexican background.

Central-American Background—These participants were less likely to experience high (OR=0.68; 95%CI:0.56,0.82) (vs. low) anxious-depression compared to those of Mexican background.

South-American Background—These individuals were less likely to show moderate (OR=0.80;95%CI:0.68,0.94) (vs.low) anxious-depression compared to individuals of Mexican background. Conversely, participants from *"Other"* Hispanic/Latino background were more likely to show moderate (OR=1.32;95%CI:1.06,1.64) (vs.low) anxious-depression compared to individuals of Mexican background.

There were no significant differences between individuals from Dominican and Cuban background and the different classes of anxious-depression compared to individuals of Mexican background. Table 4 summarizes these findings.

Discussion

Individuals from different Hispanic/Latino backgrounds were clustered in 3 distinct classes of anxious-depression symptomatology. Using the latent class approach allowed us to better visualize the percentage of individuals that fall into a low, moderate and high category of the constellation of anxious-depression symptomatology. Sixty percent, 30% and 10% of participants had low, moderate, and high anxious-depression symptomatology, respectively. Our results provided evidence that 30% of participants reported a moderate anxious-depression symptomatology demonstrating the clinical importance of this construct. Our findings highlight the importance of screening for anxious-depression symptomatology as a dimensional construct rather than screening for anxiety and depression separately. A recent study demonstrated that the clinically useful depression outcome scale (CUDOS) was a reliable and valid measure to identify the anxious distress specifier among patients with major depression that is included in the new DSM-5 [43]. Our results provide evidence that anxious-depression symptomatology could be used as a unified construct. The application of this construct in daily busy clinical settings remains to be further studied.

Our study found that individuals of Puerto Rican background had higher prevalence of anxious-depression symptomatology compared to individuals of Mexican background. This finding is consistent with previous psychiatric literature which reports that individuals from Puerto Rican background tend to have a spectrum of high anxiety, irritability and grief that falls into the culturally-bound "ataque de nervios" category [44,25]. Interestingly individuals from Cuban background did not show any significant difference between high or moderate (vs. low) anxious-depression compared individuals of Mexican background. Our findings differ from existing studies where individuals from Cuban background tend to have higher rates of anxiety symptomatology compared to Hispanic/Latinos from other backgrounds, except Puerto Ricans [25,45].

Individuals from Central-American background were less likely to experience high anxious-depression compared to those of Mexican background. Our results show a different outcome from published studies that showed higher depression, anxiety and stress among Central-Americans associated with acculturation and immigration compared to individuals of Mexican background [46]. Our results contribute to the importance of studying the association of anxious-depression symptomatology with acculturation and discrimination among individuals from Central American compared to individuals from Mexican background. There is a dearth in the literature studying the difference in psychosocial stressors among Hispanic/Latinos from Central-America compared to those of Mexican background.

Among Hispanic/Latino adults, the constellation of symptoms that constitute this construct of anxious-depression could be associated with expressions of distress that are culturally associated with family disruption, socio-economic status, migration process and diverse

concerns about health problems [44]. Among Hispanic/Latinos, the combination of anxiety and depression are complex symptoms belonging to an anxiety spectrum. These clustered of symptoms that does not meet criteria for a formal DSM diagnosis are frequently encountered in clinical setting and more research is needed to determine the association with other psychosocial and health outcomes [47].

The prevalence of major depression among US Hispanic/Latino individuals has been reported to be between 8% and 15% and for anxiety between 5% and 11% compared to approximately 23% of anxiety and depression in Caucasian individuals [26,48,49]. Our study did not examine the level of impairment associated with depression or anxiety symptomatology. The importance of our results is the different manifestation of anxious-depression symptomatology among different Hispanic/Latino groups. Recent studies have emphasized the need to further study symptoms of anxiety and depression among different Hispanic/Latinos due to the severity of the symptoms that are usually unreported [50,51]. The anxious-depression construct presented here is an important step in studying how these symptoms varied among Hispanic/Latino groups and how they can predict outcomes related to health, socio-economic stressors, family cohesion and past emotional experiences and/or resilience [52,53,51]. Our results illustrated in Table 3 provide evidence that there are significant differences among classes of anxious-depression symptomatology stratified by different socio-demographic factors.

Another important issue regarding the high prevalence of moderate anxious-depression symptomatology in our sample is the fact that these symptoms may have been present for quite some time. A recent cross-sectional study found a high prevalence of anxious-depression among Hispanic/Latino youth suggesting that this constellation of symptoms may manifest early in life among this ethnic group [54]. Additionally, the odds of developing anxiety and depression among Hispanic/Latinos were higher when there were considerable immigration and psychosocial stressors [54]. Another cross-sectional study of Hispanic/Latinos showed that anxious-depression symptomatology is high when immigration stressors and poor acculturation are present [55]. Conversely, and consistent with the literature, having social and familial support reduced the odds of developing anxiety and depressive symptoms [54,56,55]. For practitioners and policy leaders, it would be important to identify clusters of anxious-depression symptomatology among Hispanic/Latino persons attending their community health centers. Knowing the prevalence of anxious-depression clusters among attendees to the community health centers will provide valuable information to tailor psychosocial interventions, preventive programs, support and linkage to community services that consumers might need. One of the challenges is the lack of an adequate time-efficient instrument to screen for anxious-depression in busy community health centers.

A limitation of this study was the cross-sectional design and the lack of control for important psychosocial covariates such as perceived discrimination, level of social support and comorbid psychiatric, and medical conditions. This study controlled for language preference, level of education and income that are usual stressors reported in the Hispanic/Latino community. Additionally, we used the CES-D and STAI which are not frequently used in community health centers. We also did not find a similar study to compare

measurements of the anxious-depression construct with the same scales used in our study. At the same time, our study has the strengths of the large sample size of a comprehensive epidemiological study, and data on symptoms of anxiety and depression among Hispanic/Latino adults from different backgrounds and different geographical areas of the United States.

In conclusion, our study contributes to the literature by demonstrating the value of identifying a spectrum of anxious-depression symptomatology, the relevance to clinical settings and that these classes vary among Hispanic/Latinos from different backgrounds. The different classes of anxious-depression symptomatology should be further explored, and may serve as meaningful predictors or outcomes in future public health, psychosocial interventions or evaluation of ongoing community health programs.

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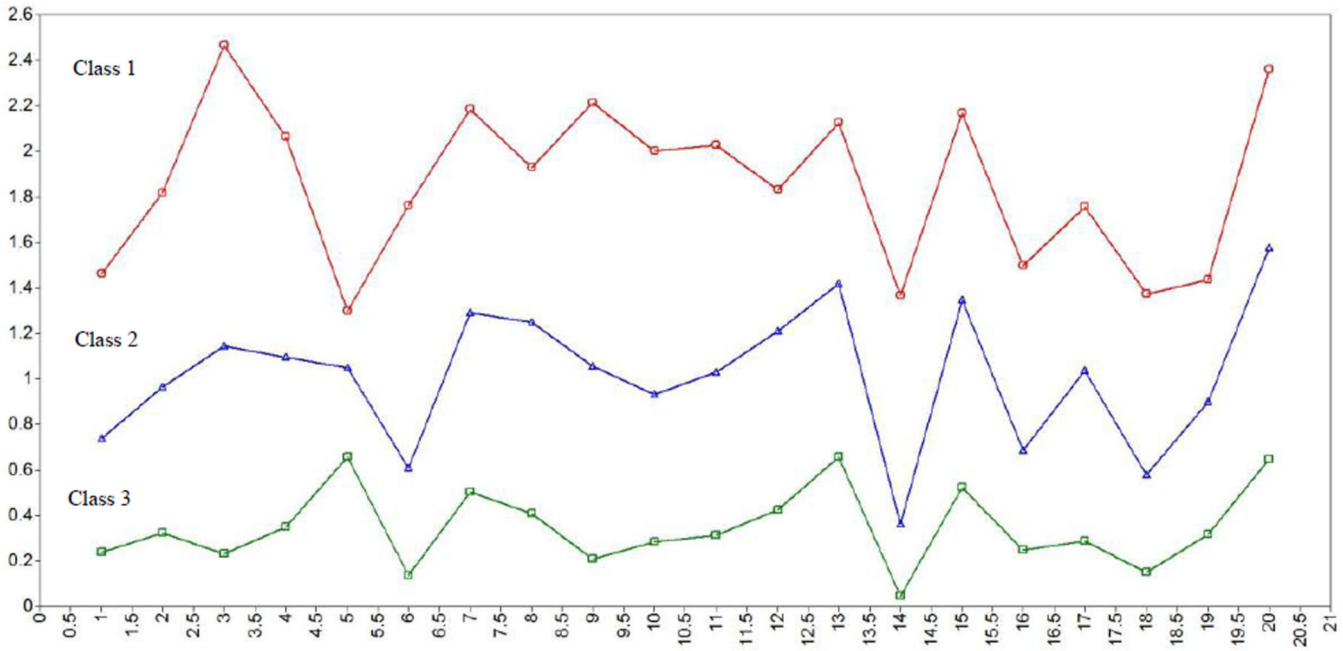

Figure 1.

Illustration of different classes of *anxious-depression* based on their conditional mean response of the items from the CES-D and STAI.

Annotation: Class 1: High anxious-depression (9.7%); Class 2: Moderate anxious-depression (30.8%); Class 3: Low anxious-depression (59.6%)

Table 1

Characteristics of participants from the HCHS/SOL (N=16064[1])

Variables *Mean (SE) or Proportion*	Female (51%)	Male (47%)
Age (SE)	41.4 (.27)	39.9 (.29)
Hispanic/Latino Background (SE)		
Mexican	38.8% (1.69)	36.8% (1.81)
Cuban	18.5% (1.63)	22.1% (1.88)
Puerto-Rican	14.8% (0.82)	16.8% (0.98)
Dominican	11.1% (0.83)	7.9% (0.74)
C. American	7.5% (0.57)	7.3% (0.64)
S. American	5.1% (0.38)	4.6% (0.37)
> than one/other Heritage	3.9% (0.40)	4.3% (0.41)
Language of Preference (SE)		
Spanish	77.0% (1.02)	72.91 (1.18)
English	23.0 (1.02)	27.09 (1.18)
Level of Education (SE)		
<High School	32.7% (0.86)	31.6% (0.93)
High School	26.3% (0.74)	30.1% (0.83)
>High School	40.9% (0.99)	38.1% (1.04)
Socioeconomic Status (SE)		
<$20,000	45.5% (0.88)	37.7% (1.18)
$20,001–50,000	34.6% (0.83)	39.8% (0.98)
>$50,000	8.8% 0.65)	15.0% (1.08)
Unreported	10.8% (0.52)	7.3% (0.50)
CES-D (SE)	7.91(0.11)	6.01(0.10)
STAI (SE)	18.69(0.34)	16.81 (0.33)

[1]This N represents the un-weighted and unadjusted sample with data on the 10-item Center for Epidemiologic Studies Depression Scale (CES-D) and 10-item State-Trait Anxiety Inventory (STAI)

SE= Standard Error

Table 2

Model fit for the latent construct *anxious-depression* among Hispanic/Latinos from the HCHS/SOL (N=16,064)

Latent Class Model	# parameters	AIC	BIC	sBIC	Entropy	LRT (*p*)
2-Class	32	807594.5	807839.9	807738.2	0.96	90446.2 (*<0.001*)
3-Class	64	773723.7	774214.5	774011.1	0.90	19786.8*(<0.001)*
4-Class	125	764418.7	765377.3	764980.1	0.92	9673.1*(<0.001*)
5-Class	146	747014.2	748133.9	747669.9	0.95	8433.7 (0.06)

Abbreviations: AIC, Akaike information criteria; BIC, Bayesian information criteria; ABIC, sample size adjusted Bayesian information criteria; LRT, bootstrapped likelihood ratio test.

Table 3

Socio-demographic factors across different classes of anxious-depression

	Class 1 (High Anx-Dep) (%, SE)	Class 2 (Mod Anx-Dep) (%, SE)	Class 3 (Low Anx-Dep) (%, SE)	*p*-value*
Gender				
Female	46.01 (0.71)	56.54 (1.11)	74.20 (1.57)	<.0001
Male	54.00 (0.71)	43.46 (1.11)	25.80 (1.57)	
Language Preference				
Spanish	76.43 (0.94)	72.83 (1.20)	72.51 (2.18)	.0027
English	23.57 (0.94)	27.83 (1.20)	27.49 (2.18)	
Age				
18–44	61.52 (0.87)	60.04 (1.08)	49.59 (2.01)	<.0001
45–64	29.94 (0.66)	31.91 (0.93)	42.52 (1.93)	
65+	8.54 (0.50)	8.06 (0.57)	7.89 (0.86)	
Education				
<HS	27.43 (0.88)	37.61 (1.08)	43.28 (1.91)	<.0001
HS	28.19 (0.76)	27.90 (0.93)	28.94 (2.10)	
>HS	44.39 (1.04)	34.49 (1.14)	27.79 (1.82)	
Income				
≤20,000	35.57 (1.04)	46.86 (1.17)	61.97 (1.84)	<.0001
20,001–50,000	40.75 (0.82)	34.94 (1.10)	25.17 (1.66)	
50,001+	15.31 (1.05)	8.33 (0.70)	2.42 (0.50)	
Not Reported	8.37 (0.49)	9.88 (0.60)	10.44 (1.03)	

*Differences across classes were tested using chi-square analyses

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Table 4

Hispanic/Latino Background Predicting Class Membership: Multinomial Regression Results Comparing High and moderate anxious-depression with low anxious-depression and Mexican background as reference.

	High Anxious-Depression			Moderate Anxious-Depression		
Ethnic Background	**OR**	***95% CI***	***p***	**OR**	***95% CI***	***p***
Puerto Rican vs. Mexican	1.79	1.48, 2.16	<0.001	1.36	1.19, 1.56	<0.001
Dominican vs. Mexican	0.93	0.71, 1.21	0.67	0.97	0.85, 1.11	0.74
Central-American vs. Mexican	0.68	0.56, 0.82	0.001	0.89	0.79, 1.01	0.16
Cuban vs. Mexican	1.14	0.96, 1.36	0.19	0.91	0.82, 1.00	0.11
South-American vs. Mexican	0.81	0.66, 1.01	0.12	0.80	0.68, 0.94	0.02
Other vs. Mexican	1.42	0.87, 2.22	0.23	1.32	1.06, 1.64	0.03

*Adjusted for age, gender, language preference, education and income. Weighted to the 2010 census.