



HHS Public Access

Author manuscript

J Health Care Poor Underserved. Author manuscript; available in PMC 2015 April 03.

Published in final edited form as:

J Health Care Poor Underserved. 2012 November ; 23(4): 1719–1732. doi:10.1353/hpu.2012.0168.

A Long Way from Home: Comparing Mental Health Measures between Foreign and U.S.-born Latinos in the Multi-Ethnic Study of Atherosclerosis (MESA)

Alejandra Casillas, MD, MSHS,

Robert Wood Johnson Clinical Scholars Program, University of California–Los Angeles and the Division of General Internal Medicine and Health Services Research, University of California, Los Angeles

Mei Leng, MS, MD,

Northwestern University

Kiang Liu, PhD,

Northwestern University

Alexandra Hernandez, MPH,

University of California, San Francisco

Sandi Shrager, MSW, PhC, and

University of Washington

Alka Kanaya, MD

University of California, San Francisco

Abstract

Background—Studies exploring the relationship between foreign-born status and mental health among Latinos in the United States have varied in their conclusions. We examined 2000–2002 MESA data on Latinos and compared responses between immigrants and non-immigrants on the Center for Epidemiologic Studies Depression (CES-D) scale and the Spielberger anxiety and anger scales.

Methods—We used logistic and linear regression to examine whether immigrant status was associated with these psychological outcomes in Latinos-overall, Mexicans-only and Other-Latinos (non-Mexicans).

Results—Compared with U.S.-born Latinos, foreign-born Latinos had significantly higher odds of meeting CES-D caseness- a score above 16, classifying depressive symptoms ($p .05$), higher anger scores ($p .001$) and a trend towards higher anxiety. These associations were similar within the Mexicans-only subgroup.

© Meharry Medical College

Please address correspondence to: Alejandra Casillas, MD, MSHS; Robert Wood Johnson Clinical Scholar; 911 Broxton Avenue, 3rd Floor; Los Angeles, CA 90024; (310) 794-8498; alejandra.casillas@hcuge.ch.

Discussion—When examining self-reported distress symptoms as outcomes, our findings do not coincide with the paradoxical effect of immigration on mental health. Furthermore, associations between immigrant status and psychological outcomes differed among the Latino subgroups.

Keywords

Immigrant health; Latino health; mental health; immigrant paradox; MESA study

Most studies find a lower prevalence of physical and mental health problems among the foreign-born population in the United States, when compared with the U.S.-born group of the same ethnicity.¹ This framework is often referred to as the “immigrant paradox,” in which foreign-born populations in the United States are protected against physical and mental health disorders, despite the fact that immigrants experience the trauma of settling into a new country and culture, and often have lower socioeconomic status (SES) than the average in the U.S.^{1,2} A 2008 study that reviewed research on this topic between 1980–2007 examined 71 articles that had looked at the health of the foreign-born *versus* the native-born of the same race/ethnicity and the general U.S. population.¹ It discussed the 10 health outcomes that have received the most coverage in the literature. When comparing the health outcomes between foreign-born individuals *versus* the general U.S. population, immigrant groups fared better in the areas of injuries, infectious diseases, obesity, cardiovascular disease, diabetes, cancers, self-assessed general health, and overall mortality. Specifically, Latino immigrants fared better in all 10 areas, which also included measures of perinatal health and mental health, even when compared with U.S.-born Latinos.

Research has shown that Latino immigrants have better mental health than their U.S.-born counterparts and non-Latino Whites, regardless of having a disadvantaged socioeconomic status.^{3–5} Latino immigrants report lower rates of anxiety disorders and substance abuse than U.S.-born Latinos and non-Latino Whites; regional and national studies have uncovered differences by nativity status for diagnoses rates of anxiety, depressive and substance abuse disorders, among other DSM III and IV psychiatric disorders.^{5–7} Foreign-born Whites and Mexicans are at significantly lower-risk of mood and anxiety disorders than U.S.-born Whites and Mexican-Americans.⁶ In one study, Mexican migrant farm workers had lower prevalence of psychiatric disorders than the general U.S. population, and yet, immigrants who were more acculturated were more likely to have psychiatric disorders.⁸ Studies among Mexican Americans have shown that the lifetime prevalence of psychiatric disorders increases with duration of residence in the United States, as does the risk for obesity, diabetes, and cardiovascular disease.⁵ But, while this phenomenon is observed among Mexican populations in the United States, inconsistent research regarding immigrant status and mental health among Latinos overall calls to question the generalizability of the immigrant health paradox. This is true especially when mental health is examined beyond reported rates of psychiatric diagnoses for all Latinos, as one group.^{9,10}

Given this inconsistency, more recent work has also looked into various pathways and possible correlates connecting Latinos’ mental health with immigration, ethnic origin, and exposure to the United States. Specifically, researchers have assessed how significant sociodemographic covariates mediate the relationship between immigrant status and mental

health within the immigrant paradox.^{10,11} However, other behavioral and clinical covariates remain to be tested. Furthermore, while prior literature has employed diagnostic scales for comparing psychiatric morbidity (which may underestimate the mental health challenges faced in certain ethnic subgroups) we use self-report scales to examine the distress symptoms that these populations report. We used data from Latinos enrolled in the Multi-Ethnic Study of Atherosclerosis (MESA), to examine the relationship between immigrant status and depressive, anxiety and anger symptoms.¹² We further determined whether these associations were modified by Latino ethnic subgroup, demographic, socioeconomic, behavioral, clinical/medical, perceived discrimination, and socio-emotional covariates, and length of time since immigration.

Methods

Study design and setting

Our analysis is a retrospective study that uses data from the Multi-Ethnic Study of Atherosclerosis (MESA). We examined baseline data on Latinos enrolled in MESA. Baseline visits took place from July 2000 to September 2002. The Multi-Ethnic Study of Atherosclerosis is a multicenter prospective cohort study of four ethnic groups initially free of cardiovascular disease at baseline, between 45–84 years of age, with the goal of identifying risk factors for subclinical atherosclerosis.¹³ Questionnaires were administered as part of the baseline visit in English or Spanish and were translated by certified translators and reviewed by bilingual study investigators. IRB approval was obtained at all sites. All participants were provided written informed consent prior to joining the study.

Study sample

The 6,814 participants were recruited from six national field centers, including Los Angeles and New York.¹³ Approximately 20% of the cohort is Hispanic. Only participants who identified themselves as Hispanic were included in this analysis. If a participant self-identified as Hispanic, he or she was asked to self-identify a narrower ethnicity: Mexican/Chicano/Mexican-American, Dominican, Puerto Rican, Cuban, or Other (asked to specify). Based on this, our sample included 767 Mexican-origin Latinos and 662 of non-Mexican origin (Other-Latinos). The latter group included Dominican, Puerto Rican, Cuban, and Other. In this analysis we will refer to Hispanics as Latinos.

Measures—outcomes

Three psychological scores from the baseline questionnaire were assessed as main outcomes: 1) the Center for Epidemiologic Studies Depression scale (CES-D), 2) the Spielberger Trait Anxiety Scale and 3) the Spielberger Trait Anger Scale. Although these measures are not formal criteria for the diagnosis of psychiatric disorders, they are widely used in research settings to assess mental health.^{13–20}

The CES-D measures depressive mood with a 20-item self-report scale that elicits symptoms of depression in community settings.¹⁴ Cronbach's alpha for reliability of the instrument has reportedly ranged between 0.84 and 0.93 in diverse populations. There is good reliability and validity of the scale in several clinic populations, and in different ethnic groups.¹⁵ A

2009 review on Spanish Language Depression-Screening Instruments supports the diagnostic accuracy of the CES-D for depression screening in Spanish-speaking outpatients.¹⁶

The 20 CES-D items are scored on a Likert-scale (0 to 3 = rarely to most). Scale items include: *I feel like a failure* and *I feel inadequate*. A summed score of 16 or more has been defined as indicating *high levels of depressed symptomatology*, meeting CES-D so-called *caseness* criteria.¹⁴ We use the concept of CES-D caseness to define people who have depressive symptoms and are at risk for a depression diagnosis.¹⁴ If more than five items were missing, the score was not calculated, but was systematically adjusted if 1–5 items were missing.¹³

The Spielberger Trait Anxiety Scale has 40-items, measuring transient and enduring levels of anxiety with strong psychometric support in various populations of adults. One item example is *I feel nervous and restless*. Higher item scores reflect a higher level of anxiety (1–4 = almost never to almost always). Although studies of the Spielberger Trait Anxiety Scale have not been done exclusively with Spanish-speaking patients, data from multi-ethnic populations and psychiatric samples of older adults and adolescents suggest adequate internal consistency and convergent validity. Internal consistency coefficients for the scale have ranged from 0.86 to 0.95.^{17,18} The MESA used a shortened 10-item version which has been validated as well.¹⁹ If more than two items were missing, the response was not scored, but adjusted for if one or two items were missing.¹³

The Spielberger Trait Anger Scale measures intensity and frequency of angry feelings.²⁰ Participants rated themselves on 10 items (1–4 = almost never to almost always). Anger items include statements like *I fly off the handle*, *It makes me furious when I am criticized in front of others*, and *I get angry when I'm slowed down by others' mistakes*. If more than two items were missing, the response was not scored. If one or two items were missing, a value of 1 was assigned to the missing items.¹³ Designed to measure the experience and expression of anger, the scale has been well validated across ethnic populations (in a study among younger Latinos, internal consistency reliability for the anger scale items ranged from 0.61 to 0.91).²¹

Measures—predictors

The MESA has two measures of immigration: 1) nativity (born in the United-States or foreign-born/immigrant) and 2) years since immigration to the United-States. Our main predictor was nativity, also referred to here as immigrant status. Nativity was categorized as U.S.-born or foreign-born. U.S.-born individuals were those who were born in the continental United States. All other Latinos (including individuals born in Puerto Rico) were classified as foreign-born. Among the immigrants, years in the U.S. was categorized as U.S. 0–10 years, U.S. 11–20 years, and in the U.S. 21 years or longer.

Measures—covariates

Demographic variables included age, sex and exam-language. Socioeconomic status (SES) was measured by family income and education. Behavioral factors included smoking and

number of alcoholic drinks consumed per week. Physical activity was self-reported using a semi-quantitative questionnaire (Typical Week Activity Survey) where physical activity was defined as the number of MET (metabolic equivalent of task) levels per week.¹³

Clinical covariates included the following: People were classified as having no diabetes, pre-diabetes or diabetes through self-report, diabetes-medication use, or fasting glucose.²² Hypertension was classified by self-report, having a diastolic blood pressure >90, systolic blood pressure >140, or use of anti-hypertensive medication. Physical-exam measures included seated blood pressure, waist circumference, and body mass index (BMI). Laboratory-values were fasting glucose, HDL cholesterol, LDL cholesterol, and triglycerides. A category for metabolic syndrome was created according to NCEP (National Cholesterol Education Program) guidelines, incorporating waist size, triglycerides, low HDL, hypertension, and fasting glucose.²³ We also included respondents' reported use of any type of antidepressant or anxiolytic medicine.

We included covariates addressing socio-emotional support and discrimination as possible mediating factors. MESA included measures of social support and cohesion which have been well-validated for diverse populations and used in prior studies.^{24,25} The emotional social support index is the sum of support scores for 6 emotional and social support item questions. Community support was measured by a neighborhood social cohesion scale. This measure is a sum of community support scored for five items on Likert scales, with higher scores for increasing cohesion. Finally, because acculturative stressors (such as reports of discrimination) are linked with increased time of residence in the United States and increased psychological distress among immigrants, we included a categorical measure of lifetime perceived discrimination (any perception *versus* none).^{26–28}

Statistical analyses

SAS version 9.2 was used for data-analysis.²⁹ Spielberger scores were normally distributed and the student's t-test was used to compare mean values across immigrant status. Since CES-D scores were right-skewed, and a CES-D>16 is used as a validated cut-point for depressive symptoms, we compared the proportion with CES-D>16 across immigrant status using the chi-squared test.

We used linear (for both Spielberger outcomes) and logistic regression (for the CES-D>16 outcome) and adjusted for significant (but non-collinear) covariates. We sequentially adjusted these models to see whether adding any covariate-group explained or attenuated the effect of immigrant status on psychological outcomes. Models were adjusted for: 1) demographic characteristics (age and sex); 2) socioeconomic status (education and income); 3) behavioral characteristics (body mass index [BMI], exercise, smoking, alcohol use) 4) clinical measures of cardiovascular risk (LDL, metabolic syndrome, diabetes mellitus, hypertension), 5) depression/anxiety medication, 6) perceived discrimination (any perceived discrimination in lifetime), and 7) socio-emotional support (Emotional Social Support Index and Neighborhood Social Cohesion Score).^{24–28}

Next we determined whether length of time since immigration modified these associations, and if time since immigration was a significant predictor of psychological outcomes.

Because 12% of the time since immigration data was missing, we used several variables to impute this (language, marital status, education, age, gender, ethnicity, BMI, CES-D score, Spielberger anger and anxiety scores). We checked whether results obtained by multiple imputations were different from list-wise deletion.

Finally we conducted analyses by Latino ethnic subgroup. Because the sample sizes for non-Mexican ethnicities were small, we conducted comparisons between Mexicans and Other-Latinos.

Results

Table 1 compares the characteristics of Latinos by immigrant status. Of 1,429 Latinos, 983 were foreign-born with a mean 29 ± 15 years since immigration. More U.S.-born Latinos were Mexican (87%), compared with the foreign-born (39%). Foreign-born Latinos were more likely to be women, have completed the baseline study in Spanish, have lower educational attainment, lower income, less smoking prevalence and alcohol use, and lower BMI and waist circumference. They had somewhat lower comorbid disease prevalence compared with the non-immigrant group despite reporting less exercise. The foreign-born also had a lower prevalence of perceived discrimination in lifetime, but also a slightly lower mean score for neighborhood social cohesion.

Table 2 shows the unadjusted comparison of psychological outcomes between the foreign-born and U.S.-born groups among Latinos overall, Mexicans, and Other-Latinos. Among Latinos overall, the foreign-born had significantly higher anger scores (15.4, $p < .001$) and a trend towards higher anxiety ($p = .07$) versus the U.S.-born. A higher percentage of foreign-born Latinos met CES-D caseness criteria (23.5% vs. 14.9%, $p = .001$). By ethnic subgroup, Mexicans followed the trend of Latinos overall—immigrants reported higher mean values of anxiety and anger, and a greater proportion met CES-D caseness criteria (22.1% vs. 14.7%, $p = .008$). In the Other-Latinos subgroup, there were no statistically significant differences between foreign and U.S.-born.

Table 3 displays the effect of immigrant status on psychological outcomes in sequentially adjusted models for the three groups. In the Latinos overall group, the positive association between foreign-born status and CES-D > 16 , and anger scores, was significant across stepwise addition of covariates. The full model showed that being foreign-born increased the odds of meeting CES-D caseness criteria (Odds Ratio [OR] 1.43, 95% Confidence Interval [CI] 1.008–2.019) and was associated with increased anger ($B = 1.07$ $p = .001$). In the Mexicans subgroup, the positive association between foreign-born and CES-D scores > 16 disappeared once SES variables were added to the model. However, there was a significant association between foreign-born status and anger in this group ($B = 1.05$ $p = .01$). Among Other-Latinos, there were no significant associations between foreign-born status and psychological outcomes. For all three groups, we found no significant associations between immigrant status and anxiety symptoms in the fully adjusted models.

In terms of significant covariates for models among Latinos overall—for the full model examining CES-D scores > 16 , being female was significantly associated with CES-D

caseness (OR 2.18, 95% CI 1.55–3.05). Higher scores on the Emotional Social Support Index were protective (OR 0.89, 95% CI 0.87–0.91) while reporting use of psychiatric medication increased the odds of meeting CES-D caseness (OR 2.59, 95% CI 1.62–4.16). Lifetime perceived discrimination also increased the odds of depressive symptoms in the Latinos overall group (OR 1.49, 95% CI 1.11–2.02). For the anxiety model among Latinos overall, female gender and metabolic syndrome were significantly associated with increased anxiety, while higher scores on the Emotional and Social Support Index and Neighborhood Social Cohesion Score were associated with lower anxiety. Use of psychiatric medications and perceived discrimination in lifetime were significantly associated with higher anxiety scores. In the linear regression model for the Spielberger anger score, increased age, increased Emotional and Social Support Index and higher scores on the Neighborhood Social Cohesion score were significantly associated with lower anger. Perceived discrimination, female gender and metabolic syndrome were related to increased anger scores among Latinos overall.

Among the Mexicans subgroup, being female was significantly associated with meeting CES-D caseness (OR 1.98, 95% CI 1.22–3.23), as was lifetime perceived discrimination (OR 1.54, 95% CI 1.00–2.36). Higher scores on the Emotional Social Support Index (OR 0.90, 95% CI 0.87–0.93) and an income level above \$40,000 (*versus* those below) decreased the odds for CES-D score >16 (OR 0.50, 95% CI 0.27–0.93). In the anxiety model for Mexicans, female gender and metabolic syndrome were significantly associated with higher anxiety, while higher scores on the Neighborhood Social Cohesion Score and the Emotional and Social Support Index were associated with lower anxiety. In the linear regression model for Spielberger anger, increased age and a higher Emotional and Social Support Index were significantly associated with lower anger scores. Perceived discrimination was associated with higher anger scores.

For Other-Latinos, female gender was significantly associated with meeting CES-D caseness (OR 2.32, 95% CI 1.44–3.75), while higher scores on the Emotional Social Support Index were protective (OR 0.88, 95% CI 0.85–0.91). Reporting use of psychiatric medication increased the odds of depressive symptoms (OR 2.43, 95% CI 1.25–4.71), as did a lower education level (high-school diploma or less) (OR 1.71, 95% CI 1.05–2.79). For the anxiety model, use of psychiatric medications and perceived discrimination in lifetime were directly associated with higher anxiety scores, while the Emotional and Social Support Index was inversely associated with anxiety. Regarding the anger model for Other-Latinos—age, Neighborhood Social Cohesion score and the Emotional and Social Support Index were inversely associated with anger scores. Perceived discrimination and smoking were associated with increased anger.

Given the subtle differences in the relationship between immigrant status and psychological outcomes between Mexicans and non-Mexicans (Other-Latinos), we formally tested ethnicity as an interaction term in the fully-adjusted Latino models. We added this to the complete Latinos overall model for all outcomes, but found no evidence of interaction.

Among the 983 immigrants, we determined whether time since immigration was a significant predictor of any psychological outcome. Of the 851 immigrants who reported

time since immigration (n=115 had missing data for this variable), 63% had emigrated 21 or more years ago, while 12% and 13% came to the U.S. 0–10, and 11–20 years ago, respectively. Using these strata of time, length of time since immigration was not associated with CES-D>16, Spielberger scores, and did not modify previous associations between other covariates and psychological outcomes. Results did not differ after imputing missing time values, or with time analyzed as a continuous predictor.

Discussion

In this analysis, foreign-born Latinos had similar or significantly higher indices of depressive symptoms, anxiety and anger when compared with U.S.-born Latinos. We did not find evidence of a protective association between nativity and psychological outcomes, even when we stratified by Mexicans *versus* Other-Latinos. In general, sequentially testing the effects of demographic, socioeconomic, behavioral, clinical/medical, discrimination and socio-emotional covariates did not change or explain these associations. Additionally, time since immigration was not a significant predictor of psychological outcomes within the foreign-born group. It is important to note that our findings do not coincide with the “protective effect” of immigration on mental health that has been previously described among mostly Mexican immigrants. Moreover, we highlight this study’s ability to move beyond examining mental health in terms of diagnoses, but to also examine measures of depression, anger, and anxiety symptoms, as well as control for behavioral, social and clinical factors.

This analysis complements recent studies in the immigrant mental health literature that show that other factors may influence the associations between nativity and mental health, and that these variables merit further attention when examining mental health among Latinos. In terms of ethnicity, it has been found that unlike Mexican immigrants, Puerto Ricans, and Cuban immigrants have substance use, mood and anxiety disorders at rates similar to the U.S.-born.⁷ Other work has shown that Latino immigrants are more likely to have worsened mental health outcomes when looking at other measures (because they may experience and report depression symptoms differently, and be more likely to have somatization of psychological distress).³⁰ A landmark study from 2008 combining two of the largest nationally representative samples of psychiatric information in Latinos, found that mental health differences and patterns between immigrant and U.S.-born varied once the data was stratified by country of origin, mental health disorder, and adjusted for demographic and socioeconomic differences across groups.⁹ Our contrasting findings can also be explained by the growing evidence showing that it is not nativity, *per se*, that accounts for the immigrant paradox effect, but instead differences in contextual and interpersonal circumstances among these groups (such as perceived discrimination, family conflict, ethnic identity, satisfaction with economic opportunities, U.S. social standing, social support, community cohesion, and neighborhood safety).^{11,31}

Previous studies have not adjusted for anthropometric and medical/clinical covariates in examining the association between nativity and psychological outcomes.³² Given that MESA contains this rich array of data for foreign-born and U.S.-born Latinos, we used these possible explanatory covariates or potential confounders, and examined the association of

immigration with mental health in sequential models. Even though Latino immigrants had better markers of physical and social health in this sample (less smoking and alcohol use, lower LDL, body mass index (BMI) and waist circumference, less perceived discrimination), being foreign-born was still associated with significantly increased odds of meeting CES-D caseness, significantly higher anger scores, and also a trend towards higher anxiety scores. This goes against the expectation that those with better physical health would also enjoy a mental health advantage. In addition, although the U.S.-born had a higher use of psychiatric medications in the Latino overall group, they had lower depression scores when compared with the foreign-born (psychiatric medications would bias towards higher depression scores, given the positive association between medication use and depression scores in this study). Nevertheless, it is possible that some categories of medications for these individuals might have uses for syndromes other than psychiatric morbidity.

The MESA did not have adequate sample size for analysis by each ethnic subgroup (e.g., Mexican, Puerto Rican, Cuban, and other Latino subgroups) while adjusting for other covariates. Even though we compared Mexican and Other-Latinos, our statistical power was still limited due to few U.S.-born individuals (n=59) in the Other-Latinos subgroup. The associations between immigrant status and psychological outcomes nevertheless vary: the Mexican group most closely followed the findings of the Latinos overall group, and no significant associations were observed in the Other-Latinos subgroup. As the literature suggests, findings may change after accounting for the heterogeneity of Latinos. The differing patterns between the two subgroups supports that conclusions about Latinos in relation to immigrant status and psychological outcomes should be followed up with specific analyses by ethnic subgroups, whenever possible. This remains an interesting research area requiring larger and more complete data sets, with enough individuals in the subgroups to make comparisons.³³

Our study has some notable limitations. A majority of Latino immigrants in MESA immigrated to the United States 21 or more years ago. This is because MESA enrolled individuals between 45–84 years of age, with the goal of identifying risk factors for subclinical atherosclerosis. Because recent immigrants tend to be younger, this is an important reason as to why fewer recent immigrants were enrolled in the study. It is possible that time since immigration was not a significant predictor of psychological outcomes, because of the small sample sizes of the more-recently immigrated groups. Because time was not a significant predictor in these sensitivity analyses, immigrant groups were not further categorized or analyzed according to time since immigration. Taking all this into account, immigrants in MESA were possibly more assimilated—an explanation for why nativity may not have been protective in this sample. Research has shown that Latino immigrants increase their risk for mental health pathology over time in the United States, a pathway linked to acculturation.⁵

Another limitation is that past studies have used more extensive measures of mental health (diagnostic interviews and instruments based on DSM-IV criteria). Our psychological outcomes are self-reported data and not clinical diagnoses, so it is difficult to estimate the differences of true psychiatric morbidity between groups in this study. However, it is useful to examine the psychological symptoms (depressive mood, anxiety, and anger) that these

populations experience, since less is known about this. There may be different manifestations of mental health pathology among Latino cultures, which U.S.-based diagnostic criteria could miss.^{12,33–35}

Since MESA is a cross-sectional study we cannot conclude any causal relationships from our findings. This was a population-based sample with a cohort selected from six U.S. field centers, and so is limited to the information gathered at these sites—our findings may not generalize to other Latinos in the United States. Finally, because MESA was designed to investigate the prevalence, correlates, and progression of subclinical cardiovascular disease (CVD) in people free of CVD, our results may not generalize to the Latino population who did not meet eligibility criteria for the general study.

The prevailing belief is that Latino immigrants are at lower risk of psychiatric morbidity than U.S.-born Latinos and non-Latino White populations. As a result of these perceptions, Latino individuals, especially Latino immigrants are branded as protected from mental health pathology—which could distract from a true need for mental health support and interventions.³⁶ When looking at symptoms of depression, anxiety and anger (not just rates of diagnoses), and adjusting for important covariates, our results do not support the immigrant paradox, even when we look at Mexicans alone (the Latino subgroup where protection against mental health has been extensively described). We urge caution in generalizing the immigrant paradox of mental health seen in this study to all Latinos. We also encourage further study to examine covariates which may explain or modify the associations between nativity and mental health among Latinos.

Notes

1. Argeseanu CS, Ruben JD, Narayan KM. Health of foreign-born people in the United States: a review. *Health Place*. 2008 Dec; 14(4):623–35. [PubMed: 18242116]
2. Burnam MA, Hough RL, Karno M, et al. Acculturation and lifetime prevalence of psychiatric disorders among Mexican Americans in Los Angeles. *J Health Soc Behav*. 1987 Mar; 28(1):89–102. [PubMed: 3571910]
3. Burnam MA, Hough RL, Escobar JI, et al. Six-month prevalence of specific psychiatric disorders among Mexican Americans and non-Hispanic Whites in Los Angeles. *Arch Gen Psychiatry*. 1987 Aug; 44(8):687–94. [PubMed: 3498452]
4. Ortega AN, Rosenheck R, Alegría M, et al. Acculturation and the lifetime risk of psychiatric and substance use disorders among Hispanics. *J Nerv Ment Dis*. 2000 Nov; 188(11):728–35. [PubMed: 11093374]
5. Vega WA, Kolody B, Aguilar-Gaxiola S, et al. Lifetime prevalence of DSM-III-R psychiatric disorders among urban and rural Mexican Americans in California. *Arch Gen Psychiatry*. 1998 Sep; 55(9):771–8. [PubMed: 9736002]
6. Grant BF, Stinson FS, Hasin DS, et al. Immigration and lifetime prevalence of DSM-IV psychiatric disorders among Mexican-Americans and non-Hispanic Whites in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2004 Dec; 61(12):1226–33. [PubMed: 15583114]
7. Alegría M, Canino G, Stinson FS, et al. Nativity and DSM-IV psychiatric disorders among Puerto Ricans, Cuban Americans, and non-Latino Whites in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *J Clin Psychiatry*. 2006 Jan; 67(1):56–65. [PubMed: 16426089]

8. Alderete E, Vega WA, Kolody B, et al. Lifetime prevalence of and risk factors for psychiatric disorders among Mexican migrant farm-workers in California. *Am J Public Health*. 2000 Apr; 90(4):608–14. [PubMed: 10754977]
9. Alegría M, Canino G, Shrout PE, et al. Prevalence of mental illness in immigrant and non-immigrant U.S. Latino Groups. *Am J Psychiatry*. 2008 Mar; 165(3):359–69. [PubMed: 18245178]
10. Jerant A, Arellanes R, Franks P. Health status among U.S. Hispanics: ethnic variation, nativity and language moderation. *Med Care*. 2008 Jul; 46(7):709–17. [PubMed: 18580390]
11. Cook B, Alegría M, Lin JY, et al. Pathways and correlates connecting Latinos' mental health with exposure to the United States. *Am J Public Health*. 2009 Dec; 99(12):2247–54. [PubMed: 19834004]
12. Harris KM, Edlund MJ, Larson S. Racial and ethnic differences in mental health problems and use of mental health care. *Med Care*. 2005 Aug; 43(8):775–84. [PubMed: 16034291]
13. Bild DE, Bluemke DA, Burke GL, et al. The multi-ethnic study of atherosclerosis: objectives and design. *Am J Epidemiol*. 2002 Nov; 156(9):871–81. [PubMed: 12397006]
14. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977 Jun; 1(3):385–401.
15. Roberts RE. Reliability of the CES-D scale in different ethnic contexts. *Psychiatry Res*. 1980 May; 2(2):125–34. [PubMed: 6932058]
16. Reuland DS, Cherrington A, Watkins GS, et al. Diagnostic accuracy of Spanish language depression-screening instruments. *Ann Fam Med*. 2009 Sep-Oct;7(5):455–62. [PubMed: 19752474]
17. Spielberger, CD.; Gorsuch, RL.; Lushene, PR., et al. *Manual for the state-trait anxiety inventory (Form Y)*. Palo Alto, CA: Consulting Psychologists Press; 1983.
18. Kvaal K, Ulstein I, Nordhus IH, et al. The Spielberger State-Trait Anxiety Inventory (STAI): the state scale in detecting mental disorders in geriatric patients. *Int J Geriatr Psychiatry*. 2005 Jul; 20(7):629–34. [PubMed: 16021666]
19. van Knippenberg FC, Duivendoorn HJ, Bonken B, et al. Shortening the State-Trait Anxiety Inventory. *J Clin Epidemiol*. 1990; 43(9):995–1000. [PubMed: 2213087]
20. Spielberger, CD. *Preliminary manual for the State-Trait Anger Scale (STAS)*. Palo Alto, CA: Consulting Psychologists Press; 1980.
21. Reyes LR, Meininger JC, Liehr P, et al. Anger in adolescents: sex, ethnicity, age differences, and psychometric properties. *Nurs Res*. 2003 Jan-Feb;52(1):2–11. [PubMed: 12552170]
22. Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 2003 Jan; 26(Suppl 1):S5–20. [PubMed: 12502614]
23. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. (Adult Treatment Panel 111). Executive summary of the third report of the National Cholesterol Education Program (NCEP). *JAMA*. 2001 May; 285(19):2486–97. [PubMed: 11368702]
24. ENRICH Investigators. Enhancing Recovery in Coronary Heart Disease Patients (ENRICH): study design and methods. *Am Heart J*. 2000; 139:1–9. [PubMed: 10618555]
25. Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*. 1997; 277:918–24. [PubMed: 9252316]
26. Gee GC, Ryan A, Laflamme DJ, Holt J. Self-reported discrimination and mental health status among African descendants, Mexican Americans, and other Latinos in the New Hampshire REACH 2010 Initiative: the added dimension of immigration. *Am J Public Health*. 2006 Oct; 96(10):1821–8. [PubMed: 17008579]
27. Finch BK, Kolody B, Vega WA. Perceived discrimination and depression among Mexican-origin adults in California. *J Health Soc Behav*. 2000 Sep; 41(3):295–313. [PubMed: 11011506]
28. Portes A, Parker RN, Cobas JA. Assimilation or consciousness: perceptions of U.S. society among recent Latin American immigrants to the United States. *Social Forces*. 1980 Sep; 59(1):200–44.
29. SAS Institute Inc. *SAS® 9.2 Enhanced Logging Facilities*. Cary, NC: SAS Institute Inc; 2008.
30. Bzostek S, Goldman N, Pebley A. Why do Hispanics in the USA report poor health? *Soc Sci Med*. 2007 Sep; 65(5):990–1003. [PubMed: 17574713]

31. Alegría M, ShROUT PE, Woo M, et al. Understanding differences in past year psychiatric disorders for Latinos living in the U.S. *Soc Sci Med*. 2007 Jul; 65(2):214–30. [PubMed: 17499899]
32. Capps, R.; Fix, M.; Ost, J., et al. *The health and well-being of young children of immigrants*. Washington, DC: Urban Institute; 2004.
33. Alegría M, Mulvaney-Day N, Torres M, et al. Prevalence of psychiatric disorders across Latino subgroups in the United States. *Am J Public Health*. 2007 Jan; 97(1):68–75. [PubMed: 17138910]
34. Alegría M, Canino G, Rios R, et al. Inequalities in use of specialty mental health services among Latinos, African Americans, and non-Latino Whites. *Psychiatr Serv*. 2002 Dec; 53(12):1547–55. [PubMed: 12461214]
35. Vega, W.; Alegría, M. Latino mental health and treatment in the United States. In: Aguirre-Molina, M.; Molina, CW.; Zambrana, RE., editors. *Health Issues in the Latino Community*. New York, NY: Jossey Bass; 2001. p. 179-208.
36. Agency for Health Research and Quality. *National healthcare disparities report: 2006*. Rockville, MD: Agency for Healthcare Research and Quality; 2006 Dec. (Publication No. 07-0012)

Table 1

CHARACTERISTICS FOR LATINOS BY IMMIGRANT STATUS (%)

Characteristic	Foreign-born n=983	U.S.-born n=446	p-value
Age (years)	60.2±9.5	60.7±9.9	.32
Years since immigration to U.S.			
0–10 (%)	118 (12)	—	
11–20 (%)	130 (13)	—	
21+ (%)	620 (63)	—	
Female sex	529 (53.8)	209 (46.9)	.015
Mexican ethnicity	380 (38.7)	387 (86.8)	<.0001
Interview Language			<.0001
English	230 (23.4)	434 (97.3)	
Spanish	753 (76.6)	12 (2.7)	
Education			<.0001
High school	709 (72.1)	209 (46.9)	
>High school	274 (27.9)	237 (53.1)	
Income (yearly)			<.0001
40K	784 (79.8)	266 (59.6)	
>40K	199 (20.2)	180 (40.4)	
Smoking			.0001
Never	559 (56.9)	202 (45.3)	
Former	290 (29.5)	176 (39.5)	
Current	134 (13.6)	68 (15.3)	
Alcohol, drinks/week	3.5±8.4	5.2±10.5	.0008
Exercise, MET levels	1786.2±2308.1	2840.5±3222.71	<.0001
Systolic BP, mmHg	126.1±21.6	125.6±21.5	.70
Diastolic BP, mmHg	72.0±10.0	70.8±10.3	.05
Fasting glucose, mg/dL	110.5±40.6	111.4±39.4	.68
HDL cholesterol, mg/dL	47.6±12.9	47.4±13.0	.72
LDL cholesterol, mg/dL	121.0±33.1	117.2±32.8	.05
Triglycerides, mg/dL	154.9±107.6	163.4±88.5	.14
Body mass index, kg/m ²			<.0001
Under/Normal wt	177 (18)	59 (13.2)	
Overweight	461 (47)	174 (39)	
Obese	345 (35.1)	213 (47.8)	
Waist circumference, cm	99.4±12.3	103.2±14.7	<.0001
Hypertension	388 (39.5)	186 (41.7)	.07
Metabolic Syndrome	411 (41.9)	204 (45.8)	<.0001
Diabetes	175 (17.8)	98 (22)	.06
Psychiatric medication	66 (6.7)	42 (9.4)	.07
Emotional Social Support Index	24.1±5.8	24.5±5.4	.14
Neighborhood Social Cohesion Score	16.7±3.0	17.3±2.8	<.001

Characteristic	Foreign-born n=983	U.S.-born n=446	p-value
Perceived Discrimination in Lifetime (% Yes)	333 (33.9)	225 (50.4)	<.0001

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2COMPARISON OF PSYCHOLOGICAL OUTCOMES BY IMMIGRANT STATUS, UNADJUSTED^{a,b}

Psychological outcome for group	Foreign-born	U.S.-born	p-value
Latinos overall	n=983	n=446	
CES-D score, # >16 (%)	231 (23.5)	71 (14.9)	.001
Spielberger Trait Anxiety Scale, mean (SD)	16.33 (4.90)	15.84 (4.60)	.07
Spielberger Trait Anger Scale, mean (SD)	15.35 (4.86)	14.37 (3.69)	<.001
Mexicans	n=380	n=387	
CES-D score, # >16 (%)	84 (22.1)	57 (14.7)	.008
Spielberger Trait Anxiety Scale, mean (SD)	16.36 (4.78)	15.73 (4.60)	.07
Spielberger Trait Anger Scale, mean (SD)	15.25 (4.58)	14.18 (3.53)	<.001
Other-Latinos	n=603	n=59	
CES-D score, # >16 (%)	147 (24.3)	14 (23.7)	.92
Spielberger Trait Anxiety Scale, mean (SD)	16.32 (4.97)	16.56 (4.60)	.70
Spielberger Trait Anger Scale, mean (SD)	15.42 (4.43)	15.63 (4.48)	.73

^aTest statistic for CES-D>16 outcomes: Chi-square^bTest statistic for Spielberger outcomes: Student's t-test

CES-D = Center for Epidemiology Studies Depression Score

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 3

ASSOCIATION OF IMMIGRANT STATUS WITH PSYCHOLOGICAL OUTCOMES IN SEQUENTIALLY ADJUSTED REGRESSION MODELS FOR LATINOS OVERALL, MEXICANS SUBGROUP, AND OTHER-LATINOS SUBGROUP

Variables ^d added to model sequentially	Latinos overall (n=1396)				Mexicans (n=742)				Other-Latinos (n=654)			
	CES-D OR (95% CI)	Anxiety (Beta)	Anger (Beta)	Anger (Beta)	CES-D OR (95% CI)	Anxiety (Beta)	Anger (Beta)	Anger (Beta)	CES-D OR (95% CI)	Anxiety (Beta)	Anger (Beta)	Anger (Beta)
1) Demographic	1.54 ^b (1.15–2.08)	.39	.92 ^c	.94 ^b	1.58 ^a (1.09–2.31)	.50	.94 ^b	.94 ^b	1.02 (0.54–1.93)	–0.22	–0.05	–0.05
2) SES	1.40 ^a (1.03–1.90)	.28	.86 ^b	.85 ^b	1.29 (0.85–1.95)	.15	.85 ^b	.85 ^b	0.93 (0.49–1.79) ^d	–0.18	–0.08	–0.08
3) Behavioral	1.40 ^a (1.02–1.92)	.29	.95 ^b	.87 ^b	1.29 (0.84–1.98)	.12	.95 ^b	.87 ^b	0.94 (0.48–1.82) ^d	–0.14	.18	.18
4) Clinical/Medical	1.39 ^a (1.01–1.91)	.27	.95 ^b	.86 ^b	1.24 (0.80–1.93)	.11	.95 ^b	.86 ^b	0.96 (0.49–1.88)	–0.09	.26	.26
5) History of psychiatric medication	1.41 ^a (1.02–1.95)	.28	.95 ^b	.86 ^b	1.31 (0.84–2.05)	.15	.95 ^b	.86 ^b	1.00 (0.51–1.98)	.01	.27	.27
6) Perceived Discrimination	1.54 ^a (1.10–2.14)	.39	1.20 ^c	1.11 ^c	1.45 (0.91–2.29)	.26	1.20 ^c	1.11 ^c	1.14 (0.57–2.26)	.24	.62	.62
7) Socio-emotional Support	1.43 ^a (1.008–2.019)	.14	1.07 ^c	p<.0001	1.39 (0.86–2.24)	.12	1.07 ^c	p<.0001	1.21 (0.58–2.52)	.31	.70	.70

^a p .05

^b p .01

^c p .001

^d Group of variables added to final model: Demographic—age and sex; SES—education and income; Behavioral—BMI, exercise, smoking, alcohol use; Clinical/Medical—HTN, DM, LDL, metabolic syndrome; History of Psychiatric Medication—reported use of antipsychotics, non-tricyclic antidepressants other than MAOI's, tricyclic antidepressants, tricyclic + antipsychotic combination, or benzodiazepines; Perceived Discrimination—report of any perceived discrimination in lifetime; Socio-emotional Support—Emotional Social Support Index and Neighborhood Social Cohesion Score. CES-D model: Logistic regression, Spielberger models: Linear regression.

CES-D = Center for Epidemiologic Studies Depression Score

OR = Odds Ratio

CI = Confidence Interval

SES = Socioeconomic Status