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A Multi-Study Analysis of Conceptual and Measurement Issues Related to Health Research on Acculturation in Latinos

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Abstract

Purpose—The aims of the study were to evaluate the orthogonality of acculturation for Latinos.

Design—Regression analyses were used to examine acculturation in two Latino samples ($N = 77$; $N = 40$). In a third study ($N = 673$), confirmatory factor analyses compared unidimensional and bidimensional models.

Method—Acculturation was assessed with the ARSMA-II (Studies 1 and 2), and language proficiency items from the Children of Immigrants Longitudinal Study (Study 3).

Results—In Studies 1 and 2, the bidimensional model accounted for slightly more variance ($R^2_{\text{Study 1}} = .11$; $R^2_{\text{Study 2}} = .21$) than the unidimensional model ($R^2_{\text{Study 1}} = .10$; $R^2_{\text{Study 2}} = .19$). In Study 3, the bidimensional model evidenced better fit (Akaike information criterion = 167.36) than the unidimensional model (Akaike information criterion = 1204.92).

Discussion/Conclusions—Acculturation is multidimensional.

Implications for Practice—Care providers should examine acculturation as a bidimensional construct.

Keywords

acculturation; transcultural health; psychiatric/mental health; correlational designs; regression analysis; Latinos

In few places do intercultural contact and exchange become as apparent as they do in the Americas. Intercultural exchanges have literally shaped the development of most nations on the American continents (Akers, 2004; Beebe & Senkewicz, 2001). Cultural exchanges have been of interest to researchers across a wide range of disciplines. However, quantifying a person's thoughts about contact with another culture presents researchers with conceptual and methodological difficulties.

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This difficulty in measuring and understanding intercultural contact can be seen in differing results in research regarding acculturation and health outcomes. For Latinos living in the United States, acculturation to the host culture, that is, Anglo acculturation, sometimes negatively correlates with health outcomes (Abraído-Lanza, Chao, & Florez, 2005; Alegría, Canino, Stinson, & Grant, 2006; Alegría et al., 2007; Grant et al., 2004; Ortega, Feldman, Canino, Steinman, & Alegría, 2006; Ortega, Rosenheck, Alegría, & Desai, 2000; Vega et al., 1998; Vega, Sribney, Aguilar-Gaxiola, & Kolody, 2004), sometimes positively relates to health outcomes (Finch & Vega, 2003; Gonzalez, Naan, & Hinton, 2001), and sometimes does not relate at all (Cuéllar & Roberts, 1997). Lara, Gamboa, Kahramanian, Morales, and Bautista (2005) present a review of acculturation and health outcomes.

Definition and Measurement of Acculturation: The Problem

Problematic, then, is that acculturation is defined and measured inconsistently across studies with Latinos, making firm conclusions about its relation to health outcomes challenging. For example, some researchers use length of residency in the United States as the primary index of acculturation (Abraído-Lanza et al., 2005; Alegría et al., 2007; Ortega et al., 2006; Vega et al., 2004), whereas others use English language proficiency (Alegría et al., 2006; Finch & Vega, 2003; Ortega et al., 2000). Still others use measures specifically developed to assess acculturation broadly across multiple domains, including cuisine, cultural immersion, social relations, ethnic identification, personal values, and language (Cuéllar & Roberts, 1997; Gonzalez et al., 2001; Schwartz, Montgomery, & Briones, 2006). These measurement differences potentially lead to difficulties in synthesizing research findings.

To move forward, the construct of acculturation must first be clarified. Many who initially examined the process of acculturation framed the two cultures of the individual, the new and native cultures, as polar opposites (Park, 1928). Some modern adaptations, although certainly more nuanced, carry this traditional conceptualization of acculturation (Padilla & Perez, 2003). According to these models, known as unidimensional models, an immigrant gradually progresses toward agreement with and behavioral imitation of the new, socially dominant host culture. As shown in Figure 1, this model requires that a person in contact with a new culture must effectively “choose” between her native culture and customs and the new host culture.

Although the unidimensional approach certainly has some intuitive appeal, criticisms of this approach have increased in the last few decades. Much of this criticism highlights conceptual issues with the definition and measurement of unidimensional models (e.g., Berry, 2006). For instance, this unidimensional model prohibits a person from being acculturated to both cultures simultaneously. Measures of acculturation using the unidimensional perspective, such as the total acculturation score for the Acculturation Rating Scale for Mexican Americans, Second Edition (ARSMA-II; Cuéllar, Arnold, & Maldonado, 1995), will usually derive some measure of acculturation to the new culture and subtract from it a score of acculturation to the native culture. Thus, both those who are equally acculturated to both native and host cultures and those who are acculturated to neither culture will show a difference in score at or near zero.

The bidimensional approach—perhaps most prominently articulated by Berry (1980; Berry & Annis, 1974)—potentially resolves this conflict and places the two cultures on two separate and orthogonal continua. This approach distinguishes between those who are acculturated to both cultures and those who are acculturated to neither by theoretically allowing for acculturation to either culture to occur independently, as can be seen in Figure 1.

Empirical Support for the Bidimensional Model: Regression and Exploratory Factor Analyses

Recent empirical examinations of unidimensional versus bidimensional models of acculturation generally support the bidimensional model (Campos, Dunkel-Schetter, Walsh, & Schenker, 2007; Ryder, Alden, & Paulhus, 2000; Sabatier & Berry, 2008). Using multiple regression, Sabatier and Berry (2008) find that two dimensions, referred to as the ethnic (native) and national (new) cultures, relate differently to outcome measures of family functioning for immigrants living in Canada and France. Using similar analytical techniques, Ryder et al. (2000) find that the bidimensional model relates to indicators of mental health, personality, and self-concept better than the unidimensional model for Chinese immigrants living in Canada. Contrary to unidimensional model predictors, the two scales of the bidimensional model did not correlate well with each other and related to different indicators. One limitation of this study, however, is that two different measures of acculturation were used—one for unidimensional acculturation and a separate measure for bidimensional acculturation scores. This makes direct comparisons between the two models more difficult, because the differences observed in the strength of correlations could be due to improved psychometrics of one scale over the other.

Campos et al. (2007) examined the independence, or orthogonality, of the two dimensions of acculturation. Using exploratory factor analysis, items assessing acculturation clustered into two factors corresponding to native and host cultural practices. The use of exploratory factor analysis, which is driven by existing relations among variables in the data and not by theory, limited this study. Theoretically driven confirmatory factor analyses (CFAs) still need to be performed.

Measuring Acculturation by Length of Residency in the United States

Whereas several studies use the amount of time an immigrant has lived in the United States as a proxy measure of acculturation (e.g., Abraído-Lanza et al., 2005; Alegría et al., 2007; Ortega et al., 2006; Vega et al., 2004), relatively few examine the relation between time in the United States and theoretical indicators of acculturation (e.g., language use and peer groups). In the studies that do use time in host country as a proxy measure of acculturation, it is assumed that longer residency in the United States reflects greater acculturation to the host culture. Arcia, Skinner, Bailey, and Correa (2001) found that English language proficiency and time in the United States were significantly related, but less than 50% of the variance in acculturation overlapped with the variance in length of residence. However, language proficiency scores were derived from a unidimensional framework: The

researchers subtracted Spanish proficiency scores from English speaking scores. It is unclear whether these results would hold when a bidimensional approach is used.

A similar study with Puerto Rican women suggests that length of residency and acculturation measures relate to different health variables (Himmelgreen et al., 2004). For example, English language proficiency strongly predicted risk of obesity but time in country did not. Although not tested directly, these results suggest that acculturation and length of residence do not overlap enough to produce consistently similar results. Only English proficiency scores were used to represent acculturation, and it is unclear if other acculturation measurement strategies would have produced different results.

Purpose of the Investigation

The investigators of the present research used three different studies of Latinos living in the United States to examine measurement issues and definitions of acculturation. Specifically, the purpose of the investigation was to evaluate the following methodological weaknesses of prior acculturation studies: (a) calculating unidimensional and bidimensional scores from different instruments; (b) using time in country as a proxy for acculturation; and (c) using exploratory rather than confirmatory model estimation analyses. Study 1 used depression symptomology as an outcome variable because of the high percentage of primary care visits related to depression (Østbye et al., 2005) and depression being the leading cause of disability (Üstün, Ayuso-Mateos, Chatterji, Mathers, & Murray, 2004). Study 2 used perceived utility of a psychologist for treatment of anxiety as the primary outcome variable, as some studies suggest that although acculturation relates to perceptions of psychological services, it does not relate to perceptions of other health services, such as medical services (Fernandez y Garcia, Franks, Jerant, Bell, & Kravitz, 2011).

In Study 1, we expected that scores derived from the bidimensional model of acculturation would show stronger correlations with depression than scores derived from the unidimensional model. In Study 2, we also expected a stronger correlation of scores from the bidimensional model with perceived utility of psychological services for mental health problems than with scores derived from the unidimensional model. In the second study, we expected that length of residence in the United States would not be sufficiently related to acculturation to be considered an appropriate proxy. Specifically, we expected less than half of the variance in acculturation scores would be explained by time in country. In the third study, we first hypothesized that a bidimensional model would provide a better fit to the observed data than a unidimensional model of acculturation, and that the two dimensions would represent distinct constructs in CFA models. We also expected that the amount of time spent in the new country would not serve as an adequate proxy for acculturation and, specifically, that it would account for less than half of the variance in the best-fitting factor model.

Study 1

Method

Sample and Setting—Participants were a convenience sample of 77 Latino residents from an urban area of south central United States. Participants were recruited from local churches, Latino community groups, and through local primary care clinics. Any adult, aged 18 years or older, who identified as Latino or Hispanic was eligible to participate. Table 1 contains demographic information for these participants.

Procedures—This research protocol was approved by the internal review board for the protection of human subjects at the University of Arkansas. After informed consent was obtained, participants completed a research protocol, including a demographic questionnaire, the Acculturation Rating Scale for Mexican Americans, Second Edition (ARSMA-II; Cuéllar et al., 1995), and semi-structured interviews with trained research assistants. All research materials were available in English and Spanish. These interviews included the Mini International Neuropsychiatric Interview (M.I.N.I.; Sheehan et al., 1998) and questions developed by the researchers. Both the M.I.N.I. (Bobes, 1998) and the ARSMA-II (Cuéllar et al., 1995) had been translated previously. All other measures were forward and back-translated by bilingual research assistants. After each interview, participants were debriefed and given contact information for community health and mental health resources.

Measures

M.I.N.I.—The Major Depressive Disorder module from the M.I.N.I. was used to assess symptoms of depression as defined by the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition, text revision (*DSM-IV-TR*; American Psychiatric Association, 2000). Respondents were asked if they had experienced specific symptoms related to depression. The number of symptoms that participants endorsed was summed to form a total depression score, allowing us to assess a continuum of depressive symptom severity. Although not used for this study, typically a score of 5 would be considered diagnostic for depression. The M.I.N.I. has been shown to have a sensitivity of 0.94 and a specificity of 0.79 in addition to good reliability (Sheehan et al., 1998).

ARSMA-II—Each participant was asked to complete the ARSMA-II (Cuéllar et al., 1995), a 30-item instrument that assesses multiple domains of acculturation, including language use (Spanish or English) and preferences for peer groups (Latino or Anglo-American). Item wording was modified by replacing “Mexican” with “Latino” so that participants from other Central and South American countries could respond. The ARSMA-II produces two scores: the Mexican Orientation Scale (MOS, 17 items), which reflects acculturation to Latino culture; and the Anglo Orientation Scale (AOS, 13 items), which reflects acculturation to Anglo-American culture. Cuéllar et al. provide a Spanish translation of the scale. The scales demonstrate good internal consistency, $\alpha_{AOS} = .83$ and $\alpha_{MOS} = .88$. A total unidimensional acculturation score is derived by subtracting the MOS from the AOS.

Following pilot testing of this study, several measures were reduced due to time constraints. The ARSMA-II was reduced to 16 items. The AOS was shortened to include items 2, 5, 7, 9, 13, and 27 from the original scale. The MOS was shortened to include items 1, 3, 4, 6, 8, 12, 24, and 29 from the original scale. The reduced version of the MOS evidenced adequate reliability ($\alpha = .72$), and the AOS evidenced good reliability ($\alpha = .80$).

Results

Prior to analyzing data, four data points were removed due to participants having not completed any portion of the ARSMA-II and remaining missing values were replaced with mean substitution. Preliminary chi square and *t*-test analyses revealed no association between participants with and without missing data on gender, age, or depressive symptoms (all *p* values $>.05$).

To examine the hypothesis for Study 1, two separate regression analyses were used. For both analyses, assumptions of homoscedasticity, normality of the error distribution, and linearity of variable relations were met. The first regression tested the bidimensional model whereas the second tested the unidimensional model of acculturation. In order that the independence of the two dimensions could be examined, no covariates were included, as this could alter the relationships found. AOS ($M = 2.67$, $SD = 0.89$) and MOS ($M = 4.55$, $SD = 0.45$) subscale scores served as predictor variables, and M.I.N.I. depressive symptom sums ($M = 2.08$, $SD = 2.52$) served as the dependent variable. The unidimensional ARSMA-II score significantly predicted depression scores. (A summary of regression results is presented in a table later in the text.) For the second analysis, a bivariate regression with the ARSMA-II total score ($M = -1.86$, $SD = 1.06$) predicting depression symptoms was significant. The regression analyses for the bidimensional and unidimensional models as a whole were significant ($p < .01$). The total variance explained by the bidimensional model was greater than the unidimensional model. In the bidimensional model, the AOS predictor was significant ($p < .05$) whereas the MOS predictor was not ($p > .10$).

Discussion

Both unidimensional and bidimensional acculturation scores significantly related to depression symptoms. Nonetheless, Anglo and Latino acculturation predicted depression differently. Specifically, only acculturation to the Anglo culture related to depression symptoms. Contrary to the unidimensional model's claim that acculturation to these two cultures occurs in *equal* and opposing degrees, for example, if one β_{MOS} were to equal .25, then β_{AOS} should equal $-.25$, in this study, the two scales related to depression outcomes with varying degrees ($\beta_{\text{AOS}} = -.31$ and $\beta_{\text{MOS}} = .03$). The results of this study suggest that it is not the relinquishing of Latino cultural values and practices that is associated with lower risk for depression but rather the ability to incorporate aspects of or adapt to the new host culture.

Study 2

Method

Sample and Setting—In Study 2, the investigators collected data from a second convenience sample of 46 Latino residents of an urban south central region of the United States. Only those who were born outside the United States were included in the analyses ($n = 40$; 87.0% of the original sample). All 46 participants from the full sample were recruited from university student groups at a large state university in the region, church groups, and Latino community groups. Any Latino adult aged 18 years or older was eligible to participate. Demographic information for participants of this second study is included in Table 1.

Procedure and Measures—Participants were given the option of completing the study in either English or Spanish. Most ($n = 29$; 72.5% of the immigrant sample) completed the study in Spanish. After informed consent was obtained, participants were asked to answer demographic questions, including age, number of years participants had been living in the United States, and country of birth. Participants were then asked to complete the ARSMA-II (Cuéllar et al., 1995). The same brief version used in Study 1 was also used for this study. In this sample, the reduced version of the MOS evidenced adequate reliability between items ($\alpha = .78$), and the AOS evidenced good reliability ($\alpha = .82$).

As part of a larger study on perceived utility of various treatments for mental health problems, participants read a scenario in which the main character was struggling with anxiety and worry. Following the vignette, participants were asked to rate on a 7-point Likert-type scale the degree to which different services (e.g., consulting with a physician, taking medications, or consulting with a psychologist) would be helpful for the problem described. Higher scores indicated higher perceived utility. Only the responses to the psychologists' utility were considered for this study.

Results

Prior to data analyses, missing values were assessed and replaced with a mean substitution. To examine the first hypothesis for Study 2, the utility rating of psychologists ($M = 6.34$, $SD = 0.94$) was used as the dependent variable in two regression analyses. Assumptions of homoscedasticity, normality of the error distribution, and linearity of variable relations were met. The overall test of the bidimensional model with AOS and MOS as predictor variables and utility ratings as the dependent variable was significant ($p < .05$; for a summary of regression results see table later in text). The Anglo subscale ($M = 2.81$, $SD = 0.77$) significantly predicted perceived utility of psychologists ($p < .05$) but the Latino subscale ($M = 4.04$, $SD = 0.48$) did not ($p > .10$). Using the unidimensional model with the singular acculturation score as the predictor and utility ratings as the dependent variable, the overall model was significant ($p < .05$).

To examine the second hypothesis for Study 2, the number of years participants lived in the United States ($M = 9.38$, $SD = 5.94$) was correlated with the AOS, MOS, and the composite unidimensional measure derived from the ARSMA-II. The number of years participants had

lived in the United States did not significantly relate to the AOS, $r = .26$, $R^2 = .07$, $p = .109$, the MOS, $r = .06$, $R^2 < .01$, $p = .733$, or the composite unidimensional measure, $r = .21$, $R^2 = .04$, $p = .199$.

Discussion

This study is consistent with the previous study and builds evidence that the bidimensional model of acculturation better accounts for variance in mental health relevant outcomes than the unidimensional model. The bidimensional model accounted for more variance in ratings of psychologists' utility in treating anxiety than did the unidimensional model. Results from the bidimensional model suggest that acculturation to Latino culture was unrelated to perceptions of psychologists' utility, whereas higher acculturation to the Anglo culture related to *lower* perceptions of psychologists' utility. Generally, these results compliment other work suggesting that acculturation to the Anglo culture relates negatively to perceptions of psychologist usefulness (Ramos-Sanchez & Atkinson, 2009). This study provides evidence that length of residence may not be an appropriate proxy for acculturation because length of residence explained less than 10% of the variance in total, Anglo, or Latino acculturation scores.

Study 3

Method

Sample and Setting—All analyses for Study 3 were secondary analyses using data obtained from portions of the Children of Immigrants Longitudinal Study (CILS; Portes & Rumbaut, 2008), publicly available from the Interuniversity Consortium for Political and Social Research (ICPSR; www.icpsr.com). Participants were 5,262 middle school-aged children of immigrants (or children who had themselves immigrated prior to age 12) living in the San Diego, CA or Miami/Ft. Lauderdale, FL metropolitan regions of the United States. For this study, a subset of 669 children who were born in Spanish speaking countries in Latin America was used. An initial survey administered in schools was performed when each participant was in the seventh grade. Two follow-up surveys were conducted 3 and 10 years later. Demographic information for the subset of participants used in this study can be found in Table 1.

Procedure and Measures—As part of a larger survey administered during school time, participants at Time 1 responded to eight questions designed to assess their level of acculturation. Specifically, participants were asked to rate on a 4-point scale (1 = *not well*, 4 = *very well*) how well they (a) spoke their native (in this case, Spanish) and host (English) languages, (b) understood each language when spoken to, (c) read in each language, and (d) wrote in each language. Participants were also asked to report the length of their residence in the United States. The participants' responses were coded such that lower scores reflected longer lengths of residence as (1) all my life, (2) 10 years or more, (3) 5 to 9 years, and (4) less than 5 years. Responses were reverse coded such that higher scores reflect longer stay lengths. Descriptive statistics on participants' perceived language proficiency are reported in Table 2. These questions were developed for the purposes of the CILS and for this reason no

prior psychometric information is available. Coefficient alphas from this study are presented in Table 3.

Results

The original dataset was coded such that each participant who reported that they did not speak Spanish was considered to have missing data. We therefore recoded these cases as being “0” or indicative of being not at all proficient in Spanish. This changed the acculturation-relevant questions to 5-point rather than 4-point scales. Table 2 shows the descriptive statistics for each variable used in these analyses with these changes made. Before running analyses, seven cases were deleted because of missing data, representing less than 5% of the sample.

Maximum likelihood CFAs were performed on these data to test the adequacy of the bidimensional and unidimensional models in reproducing the original variance–covariance matrix. Although multivariate normality was violated in this study (Mardia’s standardized coefficient = 50.89), given the large sample size, fit indices and standardized parameter estimates of the two models still offer valid methods of comparison (Wang, Fan, & Willson, 1996). Because chi-square tests of model significance are very sensitive to large sample sizes (Tabachnik & Fidell, 2007), models were evaluated for adequate fit using the following criteria: comparative fit index $>.95$, standardized root mean square residual $<.08$, and root mean square error of approximation $<.08$.

An initial CFA was conducted with English language (Anglo acculturation) and Spanish language (Latino acculturation) items assigned to two latent factors. Following this, ability to write Spanish was removed because of indications in the standardized residual covariance matrix that the item was problematic and that removal did not constitute a theoretical violation of the bidimensional model. A CFA model was then specified with this item removed (Figure 2).

When perceived ability to write Spanish was removed as an indicator of Latino acculturation, the bidimensional model displayed good fit on most parameters (see Table 3 for a summary of fit statistics). The paths for speaking ($\beta = .83$), understanding ($\beta = .78$), reading ($\beta = .91$), and writing ($\beta = .87$) in English were significant at the $p < .001$ level. The paths for speaking ($\beta = .93$), understanding ($\beta = .82$), and reading ($\beta = .73$) in Spanish were also significant at the $p < .001$ level.

A second CFA was specified from these items to represent the unidimensional model of acculturation (Figure 2). This model demonstrated poor fit (for a summary of fit statistics, see Table 3). The paths for speaking ($\beta = .83$), understanding ($\beta = .78$), reading ($\beta = .91$), and writing ($\beta = .87$) in English were significant at the $p < .001$ level. The paths for speaking ($\beta < .01$, $p = .944$), understanding ($\beta = .03$, $p = .505$), and reading ($\beta = -.01$, $p = .745$) in Spanish were not significant.

In addition to evaluating fit indices, the Akaike information criterion (AIC) was used as a comparative fit statistic. Smaller AIC values indicate better fit. The AIC value (see Table 3) for the bidimensional model was substantially lower than that of the unidimensional model.

Discriminant validity of the two-factor model was assessed using the Fornell–Larcker test. For the Anglo acculturation factor, the average variance extracted was 0.70. For the Latino acculturation factor, the average variance extracted was 0.72. The squared correlation between the two factors was less than 0.01. Thus, both constructs passed the Fornell–Larcker test.

To examine the second hypothesis for Study 3, the number of years participants had lived in the United States was correlated with the unidimensional latent variable and both of the bidimensional latent variables. The correlation between the number of years participants had lived in the United States and the unidimensional latent variable was significant and positive, $r = .34, p < .001$, revealing that less than 12% of the variance in acculturation score was accounted for by time in country. Similarly, the correlation of length of residence in the United States with the Anglo acculturation factor was also significant and positive, $r = .34, p < .001$, and the correlation of length of residence and the Latino acculturation factor was significant and negative, $r = -.18, p < .001$, with both correlations representing less than 12% of the variance in factor scores.

Discussion

Unlike Studies 1 and 2, the results of this third study provide a direct comparison of unidimensional and bidimensional model and indicate that the bidimensional model is more appropriate than the unidimensional model, at least within the language proficiency aspect of acculturation. As predicted, the bidimensional model demonstrated superiority in every statistical test. First, the bidimensional model displayed better comparative fit than the unidimensional model. The bidimensional model also displayed adequate overall model fit, whereas the unidimensional model did not. All the modifications suggested by the standardized residual covariance matrix suggested that the unidimensional model was not adequately measuring the separate relations of English and Spanish language proficiency. Finally, the bidimensional model demonstrated good discriminant validity, further suggesting that Anglo and Latino acculturation factors are distinct.

Finally, this study suggests that length of residence in the United States is not equivalent to acculturation. Although length of residence did correlate significantly with total acculturation in the unidimensional model, and Latino and Anglo acculturation in the bidimensional model, overlapping variance between it and these variables was less than 12% in every case.

General Discussion

Throughout all three studies, the bidimensional model was superior to the unidimensional model. As Studies 1 and 2 contained adults from a more rural community sample (despite being classified as urban, participants were recruited from towns with populations less than 70,000) and Study 3 contained children living in large metropolitan areas, the bidimensional model also displayed superiority with markedly different populations of Latinos living in the United States. Furthermore, these studies overcame prior methodological weaknesses by measuring acculturation with items beyond just assessing time in country (such as language and peer group preferences), using only one measure to derive unidimensional and

bidimensional acculturation scores, and using confirmatory analytic techniques. Nearly all the major tenants of the unidimensional model failed to garner any evidence of support.

Implications for Research and Practice

These results point to potentially fruitful future research directions. Maintaining a bidimensional framework can lead to more nuanced follow-up questions regarding mechanisms that account for the relationship between acculturation and health outcomes. Using a bidimensional framework may help resolve conflicting research regarding this relationship. It allows researchers to test when and how approaching or avoiding native and host cultures affects well-being. Acculturation may be one mechanism for the often-found negative relationship between length of residence in the United States and health outcomes, but our results suggest a more complex relationship. Although justified by the purpose of this study, comparing two models of acculturation, not including covariates, limits the ability of these studies to draw firm conclusions regarding the relationship between acculturation and health outcomes. For this reason, future research should focus on specific immigration contexts, such as whether or not an immigrant moves to an ethnic enclave in the United States. Researchers may begin to explore why in some samples Anglo acculturation relates to better health and mental health outcomes (Finch & Vega, 2003; Gonzalez et al., 2001), whereas in other samples the two variables evidence the opposite relation (Abraído-Lanza et al., 2005; Alegría et al., 2006; Alegría et al., 2007; Grant et al., 2004; Ortega et al., 2000; Ortega et al., 2006; Vega et al., 1998; Vega et al., 2004) or none at all (Cuéllar & Roberts, 1997). This could be aided by examining the effect of an interaction of specific components of acculturation, for example, cultural beliefs about health and illness, and geographic settings.

Future efforts should also be directed at finding brief measures of bidimensional acculturation. One reason we hypothesize that prior studies have used single item proxy measures such as time in country is because they reduce participant burden. Although the ARSMA-II has been shortened to 12 items by some researchers (Cuéllar, Bastida, & Braccio, 2004), even briefer measures (e.g., 4 items) would be preferable so that they may be incorporated more easily into health research. A similar measure may be also beneficial to practice, as acculturation measures may be better used in the context of other assessments, such as larger screenings.

In summary, both prior studies and the studies reported here provide strong and compelling evidence that acculturation is not simply relinquishing native culture as one becomes more accustomed to the host culture. It is complex, multidimensional, multifaceted, and differentially related to health and mental health outcomes.

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Figure 1.

Models of the process of acculturation

*Displays the unidimensional model (Padilla & Perez, 2003; Park, 1928).

**Displays the orthogonality of the bidimensional model (Berry, 1980; Berry & Annis, 1974)

Figure 2. Structural models with perceived ability to write Spanish removed and values determined by confirmatory factor analyses

Table 1

Demographic Characteristics of Study Participants

Demographic Characteristics	Study 1 (N = 77); n (%)	Study 2 N (= 40); n (%)	Study 3 (N = 669); n (%)
Gender			
Female	52 (67.5)	23 (57.5)	389 (58.1)
Educational attainment			
Elementary school	20 (26.0)	7 (17.5)	0 (0.0)
Middle school	2 (2.6)	0 (0.0)	673 (100.0)
Some high school	12 (15.6)	0 (0.0)	0 (0.0)
High school graduate or equivalent	9 (11.7)	14 (35.0)	0 (0.0)
Some college	9 (11.7)	12 (30.0)	0 (0.0)
College graduate or equivalent	2 (2.6)	6 (15.0)	0 (0.0)
Graduate school training or degree	1 (1.3)	1 (2.5)	0 (0.0)
No response	22 (28.6)	0 (0.0)	0 (0.0)
Born in the United States?			
No	75 (97.4)	40 (100.0)	669 (100.0)
Region of origin (Latin America)			
South America	3 (3.9)	2 (5.0)	124 (18.5)
Central America	5 (6.5)	4 (10.0)	220 (32.9)
Caribbean	2 (2.6)	0 (0.0)	192 (28.7)
Mexico	64 (83.1)	33 (82.5)	133 (19.9)
No response	3 (3.9)	1 (2.5)	0 (0.0)
Years in the United States			
Since birth	Not available	0 (0.0%)	27 (4.0)
10 years	Not available	15 (37.5)	324 (48.4)
5–9 years	Not available	16 (40.0)	284 (42.4%)
<5 years	Not available	9 (22.5)	34 (5.1)

Table 2
Descriptive Statistics of Language Proficiency of Seventh grade Immigrant Children ($N = 673$)

	For Each Length of Residence in the United States; <i>M (SD)</i>						
	<i>M ± SD</i>	Min	Max	<5 Years	5–10 Years	10+ Years	Entire Life
English language abilities ^a							
Ability to speak English (<i>N</i> = 670)	3.70 ± 0.53	1	4	2.74 (0.79)	3.67 (0.51)	3.82 (0.39)	3.70 (0.47)
Ability to understand English (<i>N</i> = 672)	3.78 ± 0.44	1	4	3.06 (0.60)	3.77 (0.43)	3.86 (0.35)	3.78 (0.42)
Ability to read English (<i>N</i> = 670)	3.62 ± 0.57	1	4	2.74 (0.75)	3.58 (0.58)	3.76 (0.44)	3.59 (0.50)
Ability to write English (<i>N</i> = 671)	3.57 ± 0.61	1	4	2.65 (0.65)	3.52 (0.62)	3.70 (0.50)	3.63 (0.49)
Spanish language abilities ^b							
Ability to speak Spanish (<i>N</i> = 658)	3.43 ± 0.70	0	4	3.88 (0.54)	3.47 (0.64)	3.32 (0.70)	3.44 (0.64)
Ability to understand Spanish (<i>N</i> = 658)	3.58 ± 0.64	0	4	3.93 (0.38)	3.63 (0.60)	3.47 (0.64)	3.63 (0.49)
Ability to read Spanish (<i>N</i> = 658)	3.13 ± 0.88	0	4	3.79 (0.64)	3.26 (0.81)	3.29 (0.87)	3.26 (0.71)
Ability to write Spanish (<i>N</i> = 658)	2.94 ± 0.92	0	4	3.11 (0.75)	2.71 (0.90)	3.07 (0.86)	3.71 (0.68)

Note: Questions were asked in English.

^a Legend of Likert-type scale: 1 = *not at all*; 2 = *not well*; 3 = *well*; 4 = *very well*.

^b Legend of Likert-type scale: 0 = *not at all*; 1 = *very little*; 2 = *not well*; 3 = *well*; 4 = *very well*.

Table 3**Unidimensional Versus Bidimensional Model Comparisons**

Study 1: Regression Analysis With Acculturation Predicting Depression			
Bidimensional Model		Unidimensional Model	
r^2	.11	r^2	.10
F	4.78	F	8.38
df_{effect}	2	df_{effect}	1
df_{error}	66	df_{error}	67
p	.011	p	.005
β_{AOS}	-.31	$\beta_{\text{AOS-MOS}}$	-.31
β_{MOS}	.03		
Study 2: Regression Analysis With Acculturation Predicting Utility			
Bidimensional Model		Unidimensional Model	
r^2	.18	r^2	.13
F	4.65	F	6.42
df_{effect}	2	df_{effect}	1
df_{error}	37	df_{error}	38
p	.015	p	.015
β_{AOS}	-.43	$\beta_{\text{AOS-MOS}}$	-.36
β_{MOS}	0.06		
Study 3: CFA Results of Acculturation as Bidimensional and Unidimensional			
Bidimensional Model		Unidimensional Model	
χ^2	137.36	χ^2	1176.92
df	13	df	14
N	669	N	669
p	< .001	p	< .001
CFI	.96	CFI	.61
SRMR	.03	SRMR	.23
RMSEA	.12	RMSEA	.35
RMSEA _{95%CI}	.10-.14	RMSEA _{95%CI}	.33-.37
α_{English}	.90	α_{Unidimen}	.72
α_{Spanish}	.84		
AIC	167.36	AIC	1204.92

Note: AOS = Anglo Orientation Scale; MOS = Mexican Orientation Scale; CFA = confirmatory factor analyses; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CI = confidence interval; AIC = Akaike information criterion.