

The Relation of Acculturation to Latinas' Perceived Neighborhood Safety and Physical Activity: A Structural Equation Analysis

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ABSTRACT

Background: Physical activity rates are low for adult Latinas. In the United States, only 7.8% of adult Latinas met Centers for Disease Control and Prevention recommendations for weekly vigorous leisure-time physical activity. **Purpose:** The purpose of this study is to test a theoretical model examining the direct and indirect influence of individual factors (demographic factors and acculturation) and the direct influence of built environmental variables (perceived neighborhood safety/aesthetics) on Latinas' physical activity in a U.S. border region. **Methods:** Acculturation, perceived neighborhood safety/aesthetics, sociodemographic variables, and minutes of physical activity a week were collected from 526 Latinas using standardized survey measures. **Results:** Only 30% of the Latinas reported meeting International Physical Activity Questionnaire's vigorous physical activity criteria, 8.6% met moderate, and 46.4% met walking. Findings from the structural equation modeling indicated that acculturation was positively associated with Latinas' vigorous and moderate physical activity, with no significant relation to walking. There were no direct associations of perceived neighborhood safety/aesthetics on any of the three measures of physical activity. **Conclusions:** Data suggest that acculturating to the U.S. mainstream culture may have positive effects on Latinas' reported physical activity. Contrary to studies of other populations, the perceived neighborhood environment was not related to Latinas' physical activity. Culturally appropriate interventions are needed for Latinas who are less acculturated into the United States.

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INTRODUCTION

Approximately 77.1% of Latina adults report no vigorous leisure-time physical activity in comparison to 62.3% of non-Hispanic White women (1). According to the National Center for Health Statistics, 7.8% of adult Latinas met Centers for Disease Control and Prevention recommendations for weekly vigorous leisure-time physical activity in comparison to 12.9% of non-Hispanic White women (1).

There are a number of individual-level factors associated with Latinas' physical activity. Among the strongest correlates are sociodemographic factors such as socioeconomic status (SES), education, and marital status (2-4). Research has been mixed in showing a relation between Latinas' physical activity and acculturation defined as changes in attitudes, beliefs, and behaviors as immigrants come into contact with a new culture (5). Two studies found that less acculturated Latinas report less leisure-time activity than more acculturated Latinas (6,7). In contrast, Wilbur, Chandler, Dancy, and Lee (2003) found no relation between acculturation and Latinas' leisure-time physical activity among a lesser acculturated sample living in the Midwest (4). Differences in findings may be due to differences in operationalizations of physical activity definitions (e.g., distinctions between moderate and vigorous intensity), definitions of acculturation (e.g., years in the United States vs. language use), and the lack of adjustment of confounding variables (e.g., demographic). Because many less acculturated Latinos report lower incomes (2-4), it may be that SES largely accounts for the low physical activity rates evident in this community.

Public health research continues to place emphasis on understanding individual health behavior in the larger context (8-10). Two recent literature reviews show a direct link between the physical environment and individuals' physical activity (11,12). Access to facilities and aesthetic features had significant associations with physical activity whereas perceived safety from crime showed less-strong relationships. Perceived environment on Latinos' physical activity also show mixed results.

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Living in a community where access to indoor or outdoor places to exercise is significantly associated with Latinas' higher leisure activity among a sample of low-acculturated Latina immigrants (2). In contrast, poor street lighting, traffic, unattended dogs, safety, and places within walking distance were not significant predictors of leisure physical activity among the same sample of less acculturated Latinas (2). A study among urban midwestern less acculturated Latinas found no significant association between perceived safety from crime and physical activity despite women's elevated perceptions of their neighborhood as unsafe. The findings of Voorhees and Rohm show that those who perceived their neighborhood as safe from crime were more active, but these relations were not statistically significant (3).

Because the aforementioned studies do not examine the influence of acculturation on women's perceived environment, it is unclear whether discrepancies in study findings are due to personal characteristics that could influence how Latinas view their environment. Many recent immigrants arrive from rural or impoverished environments and they may view their current environment differently than those who have lived in the United States for longer periods (13). In turn, this diverse perception of the environment could account for the differences in results of studies evaluating the relation between the environment and physical activity. Understanding the way in which Latinas from diverse acculturation levels view their environment could help investigators understand the role of the perceived environment on their physical activity. To date, research has not evaluated the simultaneous influence of acculturation and perceived environment on Latinas' physical activity.

The study presented here examines the direct and indirect influence of individual factors (demographic factors, acculturation) and the direct influence of environmental variables (perceived neighborhood safety/aesthetics) on Latinas' physical activity. The study incorporates constructs from the Social Ecologic Framework (SEF) (8–10) and Cohen's Structural Model of Health Behavior (14). SEF emphasizes the importance of identifying various physical, psychological, and social conditions within environments that can influence an individual's physiologic, emotional, and/or social well-being. Cohen's model is an extension of SEF which identifies four distinct environmental factors that influence health behaviors. The premise of this model is that the structural factors can change health behavior directly and beyond an individual's control, without changing their beliefs, skills, attitudes, or knowledge (14). Specifically, the construct of physical structures (i.e., streetlights, litter, and trees/grass) were expected to influence physical activity among our sample of Latinas. Thus, both models emphasize the importance of understanding the individual's behavior in their context and that human behavior is reciprocally determined by the individual and the environment (15).

We proposed three hypotheses. Given recent evidence of environmental influences on individuals' physical activity (16–19), we hypothesized that the perceived environment will have a direct influence on Latinas' physical activity. Second, we hypothesized that controlling for sociodemographic factors, acculturation will directly influence Latinas' perception of the environment. Further, we hypothesized that controlling for SES, acculturation will be positively associated with Latinas' physical activity levels as measured by a physical activity tool that takes into account occupational activity (4,20,21).

METHODS

Design and Sample

Data for our study were collected at baseline from parents/caregivers recruited into a randomized community study targeting the prevention of childhood obesity. Thirteen schools in the southwest region of San Diego County, approximately 6 miles from the Mexican border, participated. To be eligible, the schools had to have (a) Latino enrollment of at least 70%, (b) not participated in an obesity-related intervention program in the past 4 years, and (c) a defined attendance boundary (i.e., not a charter or magnet school). Families of children, regardless of their ethnicity, enrolled in kindergarten to second grade were recruited to participate if they met the following criteria: (a) no major health problems, (b) residence within the school attendance boundaries, and (c) family did not intend to move away from the area within a year. Families were recruited via flyers, letters, telephone calls, face-to-face contact at the school, and presentations at school events. A total of 1,054 families were screened; 1,005 met the eligibility criteria, and 812 agreed to complete the baseline measures.

Procedure

Parents/caregivers completed a self-administered survey at their children's school. The 60-min surveys were available in Spanish and English. The children's and their parents' weight and height data were measured by trained bilingual/bicultural research assistants using portable scales and stadiometers. Following completion of measurements, parent-child dyads were given a \$20 incentive. This protocol was approved by the San Diego State University Institutional Review Board.

Measures

Physical activity. The short version of the self-administered International Physical Activity Questionnaire (IPAQ) assessed the frequency and duration of walking, moderate intensity, and vigorous intensity physical activity for occupational purposes, house and yardwork, transportation, and leisure during the last 7 days. These items have

been tested and evaluated for reliability and validity with more than 2,500 adults from 12 countries. The test-retest reliability for the self-administered short form IPAQ was $\rho = 0.75$. The criterion validity for the self-reported short form IPAQ against the Computer Science Applications, Inc. accelerometer was $\rho = 0.30$.

Meeting guidelines for total physical activity. The IPAQ was scored using the International Prevalence Study's scoring protocol (available at <http://www.ipaq.ki.se>) to classify participants as meeting or not meeting current physical activity guidelines of at least 30 min of moderate-intensity physical activity on most days of the week or at least 20 min of vigorous-intensity physical activity on 3 or more days per week (22,23). The IPAQ scoring protocol for moderate (Category 2) physical activity levels were defined by the following criteria:

1. Three or more days of vigorous-intensity activity of at least 20 min per day
- OR
2. Five or more days of moderate-intensity activity and/or walking of at least 30 min per day
- OR
3. Five or more days of any combination of walking, moderate-intensity activities, or vigorous-intensity activities achieving a minimum total physical activity of at least 600 MET-minutes per week.

Meeting guidelines by walking. Walking was measured using two questions from the IPAQ that assessed the frequency in days per week and duration in minutes per day at work and at home; walking to travel from place to place; and any other walking for recreation, sport, exercise, or leisure. Respondents were classified as regular walkers if they met the public health guidelines (22) by reporting walking 5 days per week for 30 min per day (≥ 150 min/week) and nonregular walkers if they walked less than this amount.

Perceived neighborhood safety/aesthetics. A modified version of the U.S. Department of Transportation, Partnership for a Walkable America, Pedestrian and Bicycle Information Center, and the United States Environmental Protection Agency's Walkability Checklist was used (24). Six questions assessed perceived neighborhood safety/aesthetics including the presence of crime, lights, and vehicle exhaust in the neighborhood. All response options were dichotomous (i.e., "There is not enough light," *yes/no*). The final model included only significant items assessing perceived neighborhood safety/aesthetics (6 items; $\alpha = 0.60$).

Acculturation. Acculturation was measured by using a 30-item scale developed for Mexican Americans (5). Reliability and validity were evaluated with more than

300 participants representing five generational levels (5). One-week test-retest reliability was 0.94 and 0.96 for the Anglo Orientation Scale and Mexican Orientation Scale, respectively. Construct validity was supported with a Pearson product moment correlation of 0.61 ($p < .001$) between acculturation and generational status. In a previous study with the target population, significant differences were observed in levels of acculturation by generation status (25). Respondents were asked to indicate how well the questions described themselves on a 5-point scale from 1 (*not at all*) to 5 (*often/almost always*). Sample items include "I speak English/I speak Spanish," "I enjoy listening to English language music/ I enjoy listening to Spanish language music," and "I associate with Anglo-Americans/I associate with Mexicans and/or Mexican Americans." We characterized the respondents into the following two groups: (a) Anglo acculturated were more likely to report speaking English and associate with Anglo Americans, and (b) Mexican acculturated were more likely to report speaking Spanish and associate with Mexicans and/or Mexican Americans. The Anglo-acculturated and Mexican-acculturated responses were independently summed to form two summary scores (Anglo ranged 1 to 5 and Mexican acculturated ranged -5 to -1). The internal consistency of each subscale was as follows: Anglo 13 items ($\alpha = 0.90$) and Mexican 17 items ($\alpha = 0.87$).

Demographics. Participants completed a questionnaire that assessed their age, marital status, employment status, formal education, income, race/ethnicity, and length of residence in the United States. Education and marital status were recoded into dichotomous variables (less than high school vs. completed high school or higher and not married vs. married, respectively).

Description of Model and Model Testing Procedure

From the larger database ($N = 812$), the following participants were excluded from all analyses given our interest in understanding Latina women's physical activity: men ($n = 16$) or those missing gender data ($n = 11$), non-Latinos or non-Mexican Americans ($n = 18$), and those who completed an English survey who reported non-Hispanic ethnicity ($n = 67$). We excluded Latinas reporting more than 16 hr of walking, moderate, and vigorous physical activity ($n = 8$) because they were outliers according to IPAQ's data-processing guidelines. We also excluded 166 participants who had missing data across key variables (e.g., acculturation, perceived environment, and IPAQ measures). The frequency of missing data for each key variable was less than 10% and was not specific to the IPAQ measures or other constructs. There were no statistically significant demographic differences between the excluded sample and those that were included. Thus, the functional sample size for model testing was 526.

We evaluated demographic, perceived neighborhood safety/aesthetics, and prevalence of physical activity differences between Anglo- and Mexican-acculturated participants (Table 1). Given our interest in examining the independent effects of acculturation using a bicultural orientation model (5), two primary models were tested: Anglo acculturation and Mexican acculturation models, respectively (see Figures 1–3). The rationale for separating the two models into Mexican and Anglo acculturation is that Cuellar's Acculturation measure dichotomizes acculturation into these two cultural orientations: Anglo oriented and Mexican oriented. Both models were composed of latent and observed variables. Latent variables representing Anglo acculturation, Mexican acculturation, and perceived neighborhood safety/aesthetics

were specified. Observed variables representing vigorous activity, moderate activity, and walking were specified as the target outcomes. Education and marital status were specified as control variables. For both models, direct paths from Anglo acculturation and Mexican acculturation to perceived neighborhood safety/aesthetics, vigorous and moderate physical activity, and walking were specified. In addition, direct paths from perceived neighborhood safety/aesthetics to vigorous and moderate physical activity, and walking were further specified. Thus, an indirect effect from the acculturation latent variables to the target outcomes via the perceived neighborhood safety/aesthetics latent variable was tested. To control for the influence of education and marital status, these variables were specified to be (a) correlated with the acculturation latent variables

TABLE 1

Demographic Characteristics, Perceived Environmental Differences, and Prevalence of Physical Activity Between Mexican- and Anglo-Acculturated Latinas*

	<i>All Participants</i>	<i>Mexican Acculturated</i>	<i>Anglo Acculturated</i>	<i>p^a</i>
Demographic characteristics				
Place of birth (% , <i>n</i>)				<.001
Mexico or another country	77.0 (421)	83.2 (396)	31.3 (21)	
United States	23.0 (126)	16.8 (80)	68.7 (46)	
Employment (% , <i>n</i>)				.012
Employed	36.9 (201)	34.9 (165)	50.7 (34)	
Homemaker	63.1 (343)	65.1 (308)	49.3 (33)	
Marital status (% , <i>n</i>)				<.001
Not married	28.7 (157)	25.8 (123)	49.3 (33)	
Married	71.3 (390)	74.2 (353)	50.7 (34)	
Income (% , <i>n</i>)				.416
< \$500–\$1,500	38.7 (198)	39.2 (175)	33.9 (21)	
\$1,501– > \$3,501	61.3 (314)	60.8 (271)	66.1 (41)	
Education (% , <i>n</i>)				<.001
Less than high school	38.5 (209)	41.6 (198)	16.4 (11)	
High school graduate or higher	61.5 (334)	58.4 (278)	83.6 (56)	
Mean age (<i>SD</i>)	34.01 (7.304)	34.13 (7.277)	32.98 (7.497)	.238
Mean years lived in U.S. (<i>SD</i>)	14.56 (11.06)	13.00 (10.13)	25.30 (11.54)	<.001
Mean no. of children (<i>SD</i>)	2.64 (1.192)	2.63 (1.170)	2.70 (1.349)	.667
Perceived environment ^b (% , <i>n</i>)				
Not enough grassy spaces and trees	30.2 (158)	30.3 (139)	29.0 (18)	.83
Too many dogs	13.4 (70)	12.0 (55)	22.2 (14)	.03
Too much crime	12.8 (63)	11.4 (49)	19.7 (12)	.07
Not enough light	37.8 (198)	37.4 (171)	41.3 (26)	.56
Too dirty	7.0 (37)	7.3 (34)	3.2 (2)	.22
Too much vehicle exhaust	9.9 (51)	8.8 (40)	17.2 (10)	.04
IPAQ guidelines ^c (% , <i>n</i>)				
Vigorous	30 (164)	28.4 (135)	40.3 (27)	.05
Moderate	8.2 (45)	7.8 (37)	11.9 (8)	.25
Combination	8.6 (47)	8.6 (41)	9.0 (6)	.93
Walking	46.4 (254)	45.2(215)	55.2 (37)	.12

Note. IPAQ = International Physical Activity Questionnaire.

^aThese values represent the differences between Anglo- and Mexican-acculturated Latinas. The cutoffs for Anglo acculturated are 1 to 5 and for Mexican acculturated are –5 to –1. ^bPercentage of participants who responded *yes* that this factor was a concern or problem when walking in my neighborhood. ^cIPAQ guidelines are 20 min of vigorous physical activity 3 days/week or 30 min of moderate physical activity 5 days/week or combination moderate/vigorous/walking \geq 600 MET min/week or 30 min of walking 5 days/week.

*Chi-square and *t*-test analyses were conducted to assess group comparisons.

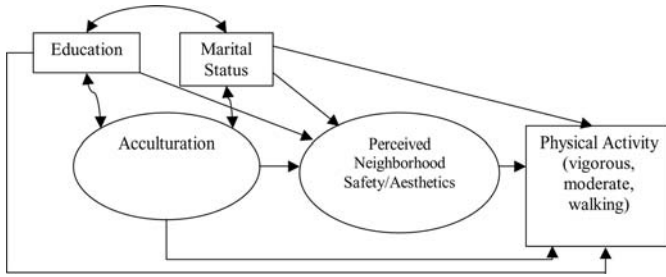


FIGURE 1 Original structural equation model.

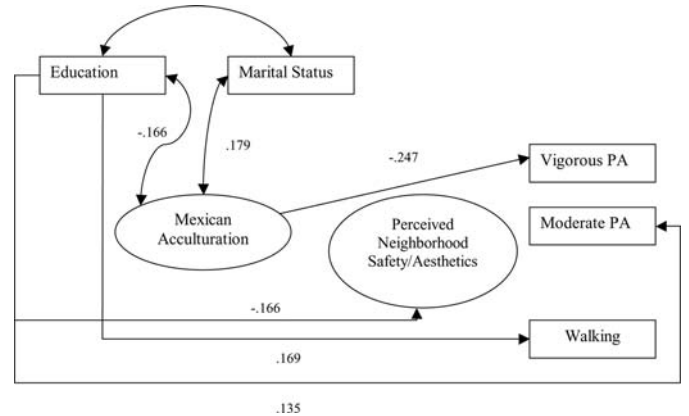


FIGURE 3 Mexican acculturation model. Note. PA = physical activity.

and (b) directly related to both perceived neighborhood safety/aesthetics and each physical activity outcome variable.

Models were estimated using weighted least squares and robust standard errors with the mean- and variance-adjusted fit statistic (WLSMV) in MPlus. Both the root mean square error of approximation (RMSEA) (26), with values less than .08 indicating a plausible model and the Tucker–Lewis Index (TLI) (27), with values greater than .90 indicating a plausible model, were used as descriptive indexes of overall model fit. These indexes were chosen because they are largely unaffected by sample size, adjust for model parsimony, and perform well with the weighted least squares and robust standard errors with the mean- and variance-adjusted fit statistic (28,29).

RESULTS

Description of Sample

The participants’ median age was 33 years (range = 21–74; see Table 1). Most Latinas were less acculturated or reported a high Mexican acculturation (median score = -4.24, range = -5.00 to -1.56). The median number of years that a participant lived in the United

States was 13 (range = 1–48 years), and 77.0% of the women were born in Mexico or another country. Approximately 38.5% of the Latina participants had less than a high school education, 63.1% were homemakers, and 71.3% were married.

Perceived Neighborhood Safety/Aesthetics

More than two thirds of the sample did not perceive lighting (62.2%), safety (87.2%), dogs (86.6%), vehicle exhaust (90.1%), grassy spaces/trees (69.8%), or filth (93.0%) as problems or concerns to walking in their neighborhood (Table 1). Anglo-acculturated Latinas were significantly more likely to perceive the environment as having too many dogs and vehicle exhaust than Mexican-acculturated Latinas, $\chi^2(1) = 4.993, p = .025$ and $\chi^2(1) = 4.148, p = .042$.

Prevalence of Physical Activity

Among participants, 30.0% met the IPAQ guidelines for vigorous physical activity; 8.2% met moderate guidelines; 46.4% met walking guidelines; and 8.6% met the guidelines for a combination of vigorous, moderate intensity, and walking (Table 1). Bivariate relations show that Anglo-acculturated Latinas were significantly more likely to report higher rates of vigorous physical activity than Mexican-acculturated Latinas, $\chi^2(1) = 3.998, p = .046$. The mean number of days per week reported for moderate activity was 1.4 (range = 0–7, *SD* = 2.04), for vigorous activity was 1.73 (range = 0–7, *SD* = 2.12), and walking was 4.34 (range = 0–7, *SD* = 2.28).

Structural Equation Models

The fit of the Anglo acculturation model was plausible according to the descriptive indexes, $\chi^2(66, N = 526) = 170.37, p < .05$ (RMSEA = .055, TLI = .900). The factor loadings for the Anglo acculturation (standardized

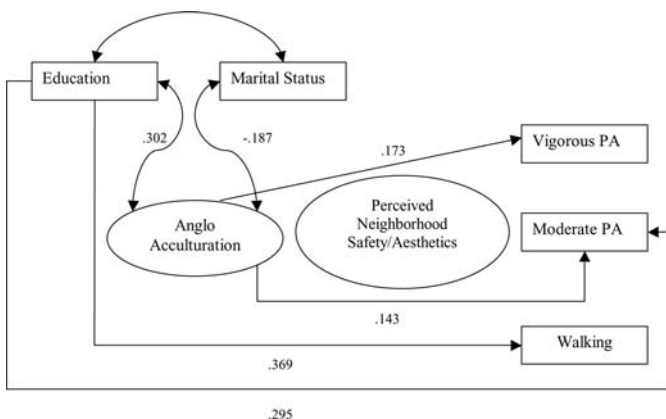


FIGURE 2 Anglo acculturation model. Note. PA = physical activity.

loadings ranged .31–.80) and perceived neighborhood safety/aesthetics (standardized loadings ranged .53–.77) latent variables were all relatively large and statistically significant (all $ps < .05$), thus supporting the factorial structure of the measurement model. For the structural relations specified in the model, Anglo acculturation was significantly and positively associated with both vigorous ($b = .173$, odds ratio [OR] = 1.19, $p < .01$) and moderate physical activity ($b = .143$, OR = 1.15, $p < .01$), indicating that higher Anglo acculturation was associated with both greater vigorous and moderate activity. However, Anglo acculturation was not significantly associated with walking or perceived neighborhood safety/aesthetics ($ps > .05$). Moreover, perceived neighborhood safety/aesthetics was not significantly associated with any of the physical activity outcomes (all $ps > .05$). With respect to the control variables, educational status was significantly related to both moderate physical activity ($b = .295$, OR = 1.34, $p < .05$) and walking ($b = .369$, OR = 1.45, $p < .05$), indicating that higher education and being married were associated with more of these two types of physical activity. Education ($r = .302$, $p < .001$) and marital status ($r = -.187$, $p < .001$) were significantly correlated with Anglo acculturation, indicating that higher education but unmarried status were associated with higher Anglo acculturation.

The fit of the Mexican acculturation model was plausible according to the descriptive indexes, $\chi^2(85, N = 526) = 288.50$, $p < .05$ (RMSEA = .067, TLI = .900). The factor loadings for the Mexican acculturation (standardized loadings ranged .31–.81) and perceived neighborhood safety/aesthetics (standardized loadings ranged .52–.73) latent variables were all relatively large and statistically significant (all $ps < .05$), thus supporting the factorial structure of the measurement model. For the structural relations specified in the model, Mexican acculturation was significantly and negatively associated with only vigorous activity ($b = -.247$, OR = 0.78, $p < .01$), indicating that higher Mexican acculturation was associated with less vigorous activity. Mexican acculturation was not significantly associated with moderate physical activity, walking, and perceived neighborhood safety/aesthetics ($ps > .05$). Moreover, perceived neighborhood safety/aesthetics was not significantly associated with any of the physical activity outcomes (all $ps > .05$). With respect to the control variables, educational status was not only significantly related to both moderate physical activity and walking, as described above in the Anglo acculturation model, but also perceived neighborhood safety/aesthetics ($b = -.166$, OR = 0.85, $p < .05$). The latter indicates that higher education is associated with more negative perceptions of neighborhood safety/aesthetics. Education ($r = -.166$, $p < .001$) and marital status ($r = .179$, $p < .001$) were significantly correlated with Mexican acculturation, indicating that less education but married status were associated with higher Mexican acculturation.

DISCUSSION

Consistent with previous studies, the recommended rates of physical activity in our sample were low in comparison to published data on Whites (1,6,21). Approximately 30% of our sample met IPAQ criteria for at least 20 min of vigorous physical activity three or more times per week, 8.2% met the guidelines for moderate physical activity, and 46.4% met the guidelines for walking. There are a variety of factors that may influence the low physical activity rates, one being occupation. More than 60% of our sample identified as a homemaker and Mexican-acculturated Latinas were significantly more likely to be a homemaker than Anglo-acculturated Latinas. As noted by other investigators, female homemakers report the lowest levels of leisure-time physical activity, with Mexican American homemakers almost twice as likely to report no leisure-time physical activity compared with White homemakers (30). This is a serious health issue for Mexican American women given that they are almost twice as likely to report being a homemaker (52%) compared with White women (26%) (30). Their roles as homemakers may help explain, in part, why Latinas report lower rates of leisure-time physical activity. As in many countries, gender-prescribed responsibilities among homemakers (e.g., childcare, etc.) often become barriers for women to engage in physical activity. In addition, employed Latinas tend to engage in more physically demanding occupations than non-Hispanic Whites in the United States (31). Because we did not assess the types of occupations our participants engaged in, we are not able to evaluate this hypothesis. Additional factors that influence physical activity include self-efficacy, social support, and lack of education about the importance of physical activity (32).

The findings from this study suggest that acculturation plays an important role in Latinas' physical activity. Study results show that stronger identification with the Mexican culture was associated with less vigorous physical activity, whereas stronger identification with the Anglo culture was associated with both vigorous and moderate levels of physical activity. Our findings were consistent with other research, suggesting a positive influence of acculturation on Latinas' activity (7,21). Several investigators have offered plausible reasons why less acculturated Latinos engage in lower levels of physical activity than acculturated Latinas and Whites. Many Latinos emigrate from countries where preventive behaviors are not promoted as in developed countries (33); they may not have incorporated leisure-time physical activity routines in their daily living. Many recent immigrants also arrive from countries where physical activity is not encouraged in women; the more they adapt aspects of U.S. culture, the more likely they will report engaging in physical activity (34). Moreover, among mainstream women in the United States, one motivator for engaging in physical activity is a woman's desire for a slimmer figure (35). Because less acculturated Latinas' ideal

body weight has been reported to be slightly heavier than more acculturated Latinas' ideal body weight (36–38), the motivation to engage in physical activity may not be as great among traditionally oriented Latinas than more acculturated Latinas.

Our data show that acculturation did not significantly influence the way Latinas' perceive their immediate physical environment. This relation was tested because social problems resulting from the migration to and within the United States include poverty and acculturation (39). We expected that Anglo-acculturated Latinas would perceive their environment less favorably than Mexican-acculturated Latinas. One reason may be that Anglo-acculturated Latinas are more cognizant and sensitive to the social and physical disparity between immigrant Latino communities versus mainstream American communities. In contrast, Mexican-acculturated Latinas were expected to view their communities more favorably than Anglo-acculturated Latinas on the premise that their previous physical environmental conditions were substandard to their current environment. The lack of association between acculturation and the perceived environment may be explained by a number of factors, including (a) measurement of the physical environment was not all inclusive (e.g., it did not include measures of social capital, street connectivity, etc.), (b) social desirability may have created a ceiling effect, (c) there may be a possible interaction between physical activity and the environment (i.e., the environment may have a stronger influence on Latinas who are active than those who are not active), and (d) there was little or no variance in the actual physical environment (e.g., sidewalk condition may be similar in both Anglo- and Mexican-oriented Latino communities).

Women's perception of the social/physical environment did not directly influence their physical activity. Research has been mixed in showing a direct relation between the social/physical environment and Latinas' physical activity. Findings from our study are consistent with those found by other investigators that included urban and rural Latina populations (2,3). Several reasons may account for our findings. Because more than two thirds of the sample did not perceive lighting (62.2%), safety (87.2%), dogs (86.6%), vehicle exhaust (90.1%), grassy spaces/trees (69.8%), or filth (93.0%) as problems or concerns in their neighborhood, the lack of variability in our measures may have precluded us from detecting true differences. Another reason may be that the environmental measure may have not included crucial dimensions (e.g., social capital, street connectivity, land-use mix diversity, and access) that may facilitate physical activity (40). We also did not use an objective measure to collect data on the physical environment; thus we do have evidence to suggest that some participants lived in poorer, more economically distressed areas. More studies with a wider range of measures are needed to examine if and how the environment plays a role in Latinas' physical activity. It is likely

that personal and social correlates such as social support, self-efficacy, and motivation are influential predictors of physical activity, and these factors may or may not interact with environmental influences on physical activity. For instance, women lacking the motivation to exercise may not engage in physical activity irrespective of having access to places to exercise, aesthetically pleasing surroundings, or a safe neighborhood. Future studies may want to evaluate the interaction between psychosocial factors and environment on Latinas' physical activity.

Limitations, Strengths, and Implications

The study had several limitations that merit noting. We cannot assess temporality because of the cross-sectional nature of the data. For instance, we are not able to state that acculturation influenced physical activity or the reverse. Participants were asked to recall their physical activity behavior over the last 7 days. Measuring behavior at one time point may not be representative of regular physical activity. Further, we relied on self-report, which is always privy to recall and social desirability bias. Acculturation may be related to social desirability. For instance, less acculturated Latinas may be more likely to provide socially desirable responses to the physical activity outcome measures (41). The correlation between objective and self-reported measures of physical activity may be more discrepant among less acculturated Latinas (32,42). Future studies should include objective measures of physical activity. The lack of relation between perceived neighborhood safety/aesthetics and physical activity may be due to measurement challenges. The environmental measure that we used may have not adequately assessed perceived environment in our Latina sample. Another reason for null findings may be due to a lack of environmental variation across our sample, as the participants came from one geographical region. The study also did not address social norms and other psychosocial variables that may influence Latinas' physical activity. Perceptions of social norms may depend on employment and marital status. For instance, in the larger context an employed woman may experience personal gains for earning an income as opposed to being a homemaker. However, in the Latino culture, homemakers have significant value and responsibilities to the family. Oftentimes, familial priorities take precedence over a Latinas' individual well-being, which may include not engaging in physical activity. Finally, correlates such as social support and self-efficacy may have been important to include, as they likely influence Latinas' physical activity.

Despite the limitations, the study had several strengths. It was guided by a strong theoretical foundation using the SEF and Cohen's Structural Model of Health Behavior. Participants included in the analyses were all Latinas, a group that is understudied in the physical activity research. Our sample also consisted of a diverse group of Latinas

from diverse acculturation levels; previous studies have included homogenous samples of lower acculturated Latinas, thereby limiting the generalizability of their results. We used the short-form of the IPAQ, which assesses occupational physical activity and accounts for other activities that are more applicable to this group, especially housework, and has demonstrated reliability and validity among Latinas (43). Finally, we used structural equation modeling, which takes into account measurement error while examining the relations between the latent constructs and the measurement model including sociodemographic characteristics (44). To our knowledge, this study is among the first published to test and report on a conceptual model of the influence of acculturation and perceived neighborhood safety/aesthetics on physical activity among Latinas.

This study offers several implications to the field of physical activity. There is a strong need to reach less acculturated Latinas for vigorous and moderate physical activity and walking. Less acculturated Latinas are more likely to live in less advantaged communities; thus, advocacy groups could rally for policy changes to increase Latinas' access to places or programs for physical activity (45). Future studies could implement culturally appropriate multilevel interventions that involve community partnerships and media advocacy to promote physical activity (46). There is evidence that community-wide education campaigns are effective in increasing physical activity (45). Messages promoting physical activity could be tailored to less acculturated Latinas and Latina homemakers and delivered via channels accessed by this population including Spanish-language newspapers and magazines, Spanish-language television, and Spanish-language radio stations. Given that acculturation was associated with more reported vigorous and moderate physical activity in this study and in previous studies (6,7), it could be argued that an intervention to facilitate greater English-language use and more interactions with individuals of the dominant culture may result in positive health outcomes. Improving English-language use has many positive health benefits (47), including removing barriers to health care access (48). Unfortunately, on many other domains of health, acculturation is associated with worse health behaviors and health outcomes (49). Thus the question remains: How can we simultaneously improve two lifestyle behaviors that are clearly associated with each other (50) and yet are influenced in opposing directions by an important variable such as acculturation? Finally, objective measures of physical environmental characteristics using Geographic Information Systems may inform the direction of future studies with Latinas and contribute to further refinement of the SEF (51).

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