

Physical Activity and Acculturation Among U.S. Latinas of Child-bearing Age

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Abstract:

The majority of Latinas of childbearing age is not sufficiently active; a significant health disparity, and is at risk for deleterious health consequences. The study's objectives were to explore acculturation and associated factors' effect on engagement in physical activity (PA) among Latinas. Based on data (2008-2011 National Health Interview Survey; $N = 7,278$), multinomial logistic models predicted odds of adherence to 2008 PA Guidelines for Americans. Among 3,386,680 Latinas, 18 to 47 years, 58.9% (standard error [SE] = 0.0073) met neither aerobic nor muscle-strengthening recommendations, after controlling for poverty, income, marital status, and competing obligations. Less acculturated Latinas (Spanish-preferring) were less likely to engage in PA than English-preferring counterparts (odds ratio [OR] = 0.57, $p < .01$). Spanish-preferring foreign-born Latinas have substantially smaller odds of meeting PA guidelines than U.S.-born English-preferring Latinas ($OR = 0.3$, $p < .001$). Puerto Ricans and Dominican immigrants are least likely to meet guidelines. Latinas are not homogeneous. Country of origin and acculturation should be considered in future PA interventions.

Keywords: Latinas | Hispanic women | physical activity | acculturation

Article:

Sufficient levels of physical activity (PA) are critical to overall good health and “normal” body weight (body mass index [BMI] $18.5 < 25$) and underpin risk reduction of several chronic diseases such as diabetes mellitus, cardiovascular disease, and obesity-related conditions. The 2008 Physical Activity Guidelines (PAG) for Americans contain recommendations that all adults should avoid inactivity and engage every week in at least 150 min of moderate or 75 min of vigorous physical activity (MVPA), such as brisk walking, to reduce risk of many weight-related health problems (U.S. Department of Health & Human Services [DHHS], 2008).

While it is well established that insufficient levels of PA and being obese are important risk factors for hypertension, hyperlipidemia, diabetes mellitus, and stroke (DHHS, 2008), Latinas

(women of Latin America heritage) are more likely to be overweight ($25 \leq \text{BMI} < 30$), obese ($30 \leq \text{BMI}$), and physically inactive, when compared with non-Hispanic Whites in general and women in particular (National Center for Health Statistics, 2009, 2012; Youlian et al., 2011). For instance, an estimated 29.4% of Latinas are obese compared with 21.8% of non-Hispanic White women (Centers for Disease Control and Prevention [CDC], 2009). According to the 2007-2010 National Health and Nutrition Examination Survey, the obesity prevalence ($\text{BMI} \geq 30$) among Latinas of childbearing age (between 18 and 47 years) was as high as 33.6% (authors' calculations). Furthermore, rates of Latinas' PA participation have declined over the last two decades, while obesity prevalence has risen (Clarke, O'Malley, Johnston, Schulenberg, & Lantz, 2009).

Latinas are not only at higher risk for obesity and inactivity, but they also belong to the fastest growing segment of the U.S. population. Currently, more than 50 million individuals (16.3% of the U.S. population) are of Latin American origin, approximately half are Latinas (U.S. Census Bureau, 2010). Since 2000, Latinos (men and women of Latin American heritage) accounted for half of the U.S. population growth with an increase of 10.2 million (29%) compared with non-Hispanic growth of 10 million (4%); the majority (60%) of this growth is attributed to a natural increase, that is, births minus deaths (Fry, 2008). The CDC Health Disparities and Inequalities Report found that Latinos experienced greater disease burdens and barriers to accessing health care services than non-Hispanic Whites due to higher levels of poverty, noncompletion of high school (HS), obesity prevalence, diabetes rates, and preventable hospitalization rates, as well as lower health insurance rates (CDC, 2011; Youlian et al., 2011).

Barriers to Engagement and Acculturation

Given the potentially large benefits of PA for this population group, it is important to understand better why Latinas are more inactive than most other populations. Several factors may make it less likely that a person engages in PA. There is some evidence that, among Latinas, lower income (Crespo, Smit, Carter-Pokras, & Andersen, 2001; Neighbors, Marquez, & Marcus, 2008), lower education levels (Corral & Landrine, 2008; Crespo et al., 2001; Neighbors et al., 2008; Slattery et al., 2006), and greater numbers of children (Crespo et al., 2001; Neighbors et al., 2008; Slattery et al., 2006) play an important role in reducing the likelihood of PA engagement. However, these factors are also intertwined with the gradual acculturation of Latinas to U.S. mainstream society.

Acculturation is defined as the process of adopting a new cultural orientation that results when an individual moves from a different cultural origin to a new cultural context (Berry, 1997). It is a complex process that may involve many different elements, such as changing residency and citizenship, adopting a new primary spoken language, changing religious affiliation, and reconciling divergent cultural views on the role of men and women in society. Attitudes toward PA, in terms of the need for it, and its appropriateness as an activity for women are part and parcel of the acculturation process. Perez-Escamilla (2011) argued that the acculturation process may augment health disparities among Latinos, but that process is complex and the associations are not always clearly defined or move all in the same direction. For example, there is consistent evidence that more acculturated Latinas report greater involvement in PA than less acculturated Latinas (Corral & Landrine, 2008; Slattery et al., 2006; Wolin, Colditz, Stoddard, Emmons, & Sorensen, 2006). Wolin et al. (2006) conducted a cross-sectional study investigating the relationship between language acculturation (e.g., language preference, U.S. generational status) and PA levels ($n = 355$). They found a positive association ($p < .001$) between higher U.S. acculturation and self-reported Leisure Time Physical Activity (LTPA). Corral and Landrine (2008) reported similar

findings from 4,190 Latinas: more acculturated Latinas had 1.94 times greater odds of reporting LTPA. However, greater acculturation among Latinos is not associated with lower obesity rates; in fact, the opposite appears to be the case (Abraído-Lanza, Chao, & Flórez, 2005; Evenson, Sarmiento, & Ayala, 2004; Wolin et al., 2006).

Still, acculturation status plays an important role in the adoption of PA habits (Abraído-Lanza et al., 2005; Evenson et al., 2004; Wolin et al., 2006), particularly, as it can lead to a reevaluation of barriers to PA such as competing obligations, personal limitations, and competing diversions (Bellows-Riecken & Rhodes, 2008; Corral & Landrine, 2008; Neighbors et al., 2008; Vermeesch, 2011).

Competing obligations include work/school obligations, caring for children, and lack of free time; all of which are likely influenced by acculturation status (Bellows-Riecken & Rhodes, 2008; Slattery et al., 2006; Vermeesch, 2011). With a higher fertility rate of 2.4 among Latinas compared with 1.8 among non-Hispanic White women (Passel, Livingston, & Cohn, 2012), Latinas are more likely to care for a greater number of dependent children. A large majority of Latinas in the age group 18 to 47 have children, and are more likely to be overweight/obese than their non-Latina counterparts, apparently because of weight gain during pregnancy persisting after the birth of a child (Albers, Greulich, & Peralta, 2006). Having a homemaker and caregiver role might also influence how Latinas participate in PA, because reported PA among homemakers is often associated with household activities rather than LTPA (Slattery et al., 2006; Sternfeld, Ainsworth, & Quesenberry, 1999). Latinas are more likely to cite family obligations as a barrier to PA than African Americans, probably due to a cultural emphasis on family unity or familismo (D'Alonzo & Fischetti, 2008). Several researchers (Crespo et al., 2001; Neighbors et al., 2008; Slattery et al., 2006) found the number of children to be negatively associated with reported PA levels. Family commitment, which is usually associated with child care and reluctance to leave children with child care providers, is inversely associated with Mexican American women's PA participation, presumably amplified when there are more children (Berg, Cromwell, & Arnett, 2002; Eyler et al., 2002).

Purpose

These factors related to acculturation must be better understood so that future PA interventions can be tailored more successfully to this population. To address the issues concerning acculturation and barriers to LTPA, we used data from the National Health Interview Survey (NHIS) to obtain nationally representative estimates for U.S. resident Latinas. The secondary analysis was designed to (a) explore if acculturation among U.S. Latinas has an independent effect on engagement in PA, (b) determine which subgroups among Latinas (defined by marital status, age group, income, education, citizenship/immigration status, country of birth, household size, etc.) are least likely to be physically active using the PAG, and (c) investigate whether PA barriers differ for overweight/obese Latinas and those of a healthy weight.

Method

Design

The current analysis is based on the public-use data from the 2008 to 2011 NHIS. The NHIS is an ongoing multipurpose, in-person, health survey of the civilian, noninstitutionalized U.S.

population conducted by the National Center for Health Statistics of the Centers of Disease Control (CDC, 2012). The NHIS uses a multistage probability sample design, sampling households throughout the 50 states and the District of Columbia. The annual NHIS consists of (a) a household component; (b) a family component for health and demographic information on all family members; (c) an adult component, administered to one randomly selected adult (“Sample Adult”) from each family; and (d) a child component (not used here). Final annual (unconditional) response rates over this 4-year period ranged from 78.7% in 2010 to 84.5% in 2008 for the family component, taking into account household nonresponse, and from 60.8% in 2010 to 66.3% in 2011 for the Sample Adult component, the main source of information for this analysis, taking into account both household and family nonresponse (National Center for Health Statistics & CDC, 2011). Starting in 2007, the sampling design of the NHIS included oversampling Latinos to allow for more detailed analysis (CDC, 2012). The combined 2008-2011 NHIS Sample Adult contained 7,278 Latinas aged 18 to 47 years.

Measures

This study’s primary outcomes are two variables representing adherence to the recommendations in the 2008 PAG (DHHS, 2008). Respondents in the “Sample Adult” of the NHIS were asked five questions about their LTPA: (a) How often do you do VIGOROUS LTPA for AT LEAST 10 MINUTES that cause HEAVY sweating or LARGE increases in breathing or heart rate? (b) About how long do you do these vigorous LTPA each time? (c) How often do you do LIGHT OR MODERATE LTPA for AT LEAST 10 MINUTES that cause ONLY LIGHT sweating or SLIGHT to MODERATE increases in breathing or heart rate? (d) About how long do you do these light or moderate LTPA each time? and (e) How often do you do LTPA specifically designed to STRENGTHEN your muscles such as lifting weights or doing calisthenics? The recommendations set forth in the 2008 PAG for adults entail (a) 150 min of moderate or 75 min of vigorous aerobic per week or an equivalent combination thereof, and (b) muscle-strengthening activities at least two times per week. Based on these recommendations and the available data, 2008-2011 NHIS participants were grouped as follows: One variable capturing adherence only to aerobic activity recommendations was dichotomized into “meets recommendations” (=1) of at least 150 min of moderate or 75 min of vigorous activity per week (2008 PAG equate 1 min of vigorous activity to 2 min of moderate activity; total minutes of aerobic activity were summed using this conversion factor) versus “does not meet aerobic activity recommendations” (=0). A second variable incorporates aerobic and muscle-strengthening activities, resulting in a four-category variable: “meets recommendations for both types of activity” (=4), “meets recommendations for aerobic activity only” (=3), “meets recommendations for muscle-strengthening activity only” (=2), and “meets neither recommendation” (=1). It is important to remember though that the NHIS data only address LTPA, whereas the 2008 PAG involves any type of PA (including occupational and household).

The acculturation measure was created through cross-classifications of a variable indicating interview language of the Sample Adult interview and a variable indicating whether a respondent was born in the United States or abroad. The six resulting categories indicating an ordinal scale of acculturation from “most” to “least” are as follows: (a) English/U.S. born, (b) English/foreign born, (c) English + Spanish/U.S. born, (d) English + Spanish/foreign born, (e) Spanish/U.S. born, and (f) Spanish/foreign born. (Notice that interviews conducted in English and Spanish by bilingual interviewers were an option offered to the NHIS respondents.) We added

region or country of origin as a proxy for substantial cultural diversity among Latinos (Weinick, Jacobs, Stone, Ortega, & Burstin, 2004).

Among the remaining predictor variables are age (years), education (less than HS, some HS, HS degree, some college, college degree, advanced degree), family income as multiples of the federal poverty level (FPL; <100% FPL, 100% < 200% FPL, 200% < 400% FPL, 400%+ FPL), marital status (married, widowed, divorced/separated, single, living with partner), country/area of origin (Mexico, Puerto Rico, Cuba, Dominican Republic, Central America, Other), current pregnancy status (yes/no), and BMI (self-reported height and weight) divided into six custom categories: (a) underweight (BMI < 18.5), (b) normal weight ($18.5 \leq \text{BMI} < 25$), (c) overweight ($25 \leq \text{BMI} < 30$), (d) Obesity I ($30 \leq \text{BMI} < 35$), (e) Obesity II ($35 \leq \text{BMI} < 40$), and (f) Obesity III (BMI 40+).

Several variables were used to capture competing obligations: (a) family type (one adult, no child under 18; multiple adults, no child under 18; one adult, 1+ child(ren) under 18; multiple adults, 1+ child(ren) under 18); (b) current work/school arrangement (works for pay, goes to school, temporarily unable to work/disabled, not working for other reasons, is family householder, unemployed/looking for work); (c) having any family member living in the household, who needs assistance of any kind or has mobility problems (yes/no); and (d) being currently pregnant (yes/no).

Data Analysis

The analysis was conducted with Stata (Version 12) software. Logistic regression models were used to predict adherence to aerobic activity recommendations and multinomial logistic models to predict adherence to the combined recommendations concerning aerobic and muscle-strengthening activities (Agresti, 2012). Results are reported using ORs adjusted for all listed (potential) predictor variables, SEs, and p values. To obtain the correct variance estimates and confidence intervals, the models incorporated the information concerning primary sampling units, strata, and weights for the Adult Sample. As the analysis combined four annual NHIS data sets, the sampling weights were divided by 4 to obtain averaged population estimates (National Center for Health Statistics & CDC, 2011).

Results

Based on a sample of 7,278, the estimated U.S. Latina population averaged 3,386,680 residents (2008-2011) between the ages of 18 and 47 years. Results in Figure 1 show the following pattern of 2008 PAG adherence in this target population: In all, 58.9% (SE = 0.0073) met neither the aerobic nor the muscle-strengthening recommendations, 2.2% (SE = 0.0018) met only the muscle-strengthening recommendation, 25.7% (SE = 0.067) met the aerobic but not the muscle-strengthening recommendations, and 13.3% (SE = 0.0046) met both recommendations of at least 150 min of moderate aerobic activity (or 75 min of vigorous aerobic activity) and at least two times muscle-strengthening activity weekly. Regardless of aerobic activity, 15.5% Latinas met the muscle-strengthening recommendations, and 38.9% of Latinas met the aerobic recommendations, regardless of muscle-strengthening activities. Among non-Hispanic White women of the same age, PA levels in all categories exceed those of Latinas, with “only” 42.2% of non-Hispanic White women not meeting either 2008 PAG recommendations, a difference of 16.7%.

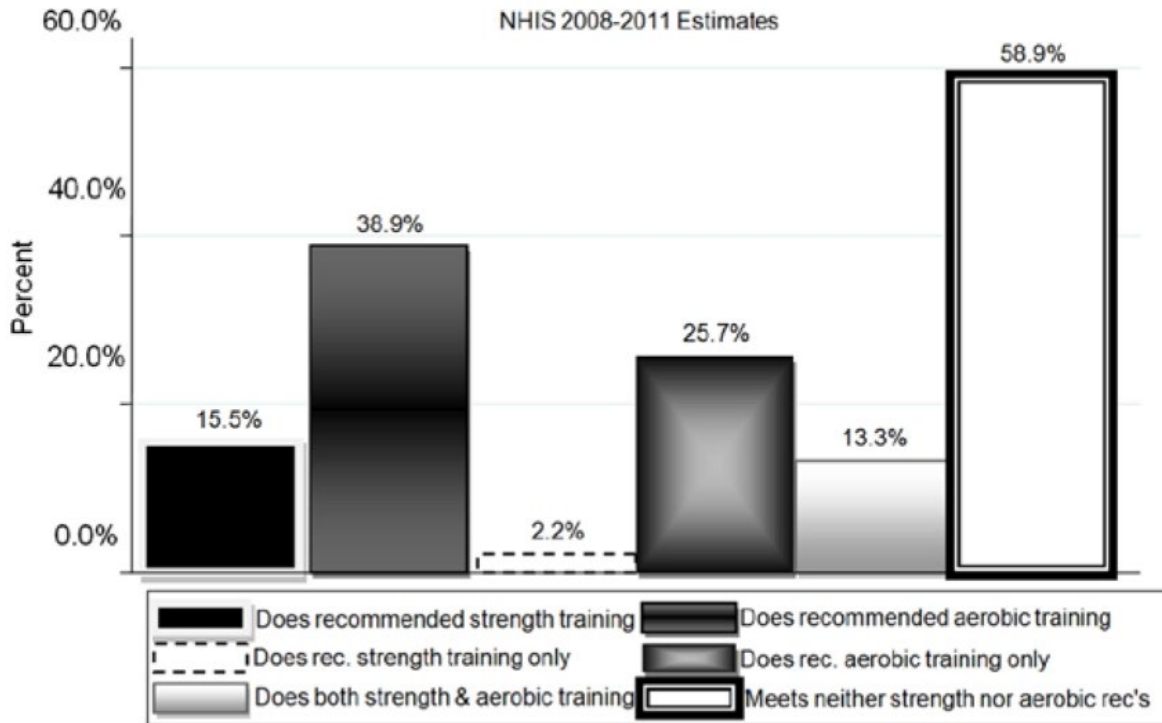


Figure 1. Percentage of U.S. Latina population (18-47) engaging in recommended physical activity.

Note. NHIS = National Health Interview Survey.

Subgroups of Latinas

Table 1 shows predictors of strength exercising and aerobic activities. Among the sociodemographic predictors, income and education show monotone increases in the odds of engaging in muscle-strengthening exercises and aerobic activities. Latinas in higher income households (400%+ FPL) have almost twice greater odds of muscle training (OR = 1.8, $p < .001$) and aerobic activity (OR = 1.94, $p < .001$) than poor Latinas; the difference between Latinas with advanced degrees and those with less than a HS education is even larger—for strengthening exercise: OR = 2.47, $p < .001$; for aerobic activity: OR = 2.86, $p < .001$.

Concerning competing obligations, results suggest that, compared with working for pay, opportunities for leisure-time aerobic activities are greater among Latinas enrolled in educational programs (OR = 1.51, $p < .009$), among family householders (OR = 1.41, $p < .001$), and the unemployed seeking work (OR = 1.69, $p < .001$). The latter also appear to have more time for muscle-strengthening activities (OR = 1.53, $p < .002$). Having at least one family member with (physical/functional) limitations dampens opportunities for leisure-time aerobic activities (OR = 0.71, $p < .038$), while pregnancy restricts aerobic and muscle-strengthening activities (OR = 0.62, $p < .01$; OR = 0.46, $p < .022$). Rather than marital status, it is family type that seems to have an effect on LTPA: Living with other adults or children reduces opportunities for meeting the recommendations for muscle-strengthening and aerobic activities, with ORs ranging between 0.54 and 0.66 ($p < .02$), but there are no significant differences between Latinas living with other adults only and those living with minor children (p values for contrasts >0.4).

Table 1. Predictors of Adherence to 2008 Physical Activity Guidelines Recommendations for Strength and Aerobic Activities.

	Meets strength recommendation			Meets aerobic recommendation		
	OR	SE	p	OR	SE	p
Age	1.10	0.05	.021	1.02	0.04	.632
Age (squared)	0.99	0.00	.043	1.00	0.00	.606
Acculturation	Reference: English interview/U.S. born					
English preferred/foreign born	0.75	0.08	.011	0.80	0.08	.021
English + Spanish/U.S. born	0.86	0.24	.596	0.76	0.14	.125
English + Spanish/foreign born	0.63	0.10	.005	0.69	0.09	.007
Spanish preferred/U.S. born	0.54	0.20	.101	0.51	0.13	.007
Spanish preferred/foreign born	0.38	0.06	.000	0.62	0.07	.000
Country of origin	Reference: Mexican Americans/U.S. born					
Mexican immigrants	0.89	.10	0.294	0.89	0.09	.249
Puerto Rican	0.67	0.10	.009	0.57	0.07	.000
Cuban	0.83	0.19	.418	0.92	0.15	.625
Dominican	0.71	0.18	.168	0.39	0.07	.000
Central American	0.76	0.10	.037	0.91	0.09	.338
Other	1.54	0.31	.035	1.44	0.24	.029
Marital status	Reference: Married-partner in household					
Widowed	1.08	0.17	.635	1.18	0.15	.190
Divorced/separated/not together	1.41	0.67	.464	0.80	0.27	.503
Single	1.11	0.15	.454	1.10	0.12	.373
With partner	1.24	0.18	.150	1.13	0.13	.298
Income group	Reference: Less than 100% FPL					
100% < 200%	1.06	0.13	.646	1.05	0.09	.568
200% < 400%	1.27	0.16	.063	1.39	0.13	.001
400+%	1.80	0.29	.000	1.94	0.24	.000
No information	1.00	0.17	.987	1.07	0.13	.591
Education	Reference: Less than HS					
Some HS	0.87	0.14	.389	1.02	0.12	.843
HS degree	1.46	0.22	.014	1.38	0.17	.009
Some college	1.93	0.34	.000	1.90	0.24	.000
College degree	1.96	0.54	.000	2.03	0.28	.000
Advanced degree	2.47	0.75	.000	2.86	0.55	.000
Current work	Reference: Works for pay					
In school	1.09	0.20	.658	1.51	0.23	.009
Disabled	0.63	0.20	.146	0.64	0.16	.071
No work	1.18	0.30	.531	1.10	0.17	.520
Family, household	1.11	0.12	.362	1.41	0.12	.000
Looking for work	1.53	0.21	.002	1.69	0.18	.000
Limitations in Family	0.67	0.16	.088	0.71	0.12	.038
Pregnant	0.46	0.16	.022	0.62	0.11	.010
BMI category	Reference: Normal weight					
Underweight (BMI < 18)	1.06	0.30	.827	0.91	0.22	.683
Overweight (25 ≤ BMI < 30)	0.87	0.08	.142	1.04	0.08	.603
Obesity I (30 ≤ BMI < 35)	0.65	0.08	.001	0.86	0.07	.055
Obesity II (35 ≤ BMI < 40)	0.59	0.11	.006	0.76	0.10	.034
Obesity III (BMI 40+)	0.38	0.08	.000	0.68	0.11	.022
Family type	Reference: One adult, no children					
2+ adults, no children	0.66	0.11	.016	0.62	0.08	.000
1 adult, 1+ children	0.57	0.08	.000	0.59	0.07	.000
2+ adults, 1+ children	0.54	0.08	.000	0.56	0.06	.000

Note. OR = odds ratio; SE = standard error; FPL = federal poverty level; HS = high school; BMI = body mass index.

Obese Latinas are less likely to engage in PA of either the muscle-strengthening or aerobic kind, with ORs between 0.38 and 0.76 ($p < .034$) compared with healthy-weight Latinas, while muscle-strengthening activities appear to peak at age 38 (if the derivative of the quadratic age function is set to $\partial Y/\partial X = 0.10424 - 0.00272X = 0$, $X = 38.3$).

Acculturation

Acculturation as defined in terms of the interview language and the country of birth is a significant predictor: Latinas born abroad and preferring Spanish have substantially smaller odds (70% reduced odds) of meeting both PA recommendations than Latinas born in the United States and preferring English (OR = 0.3, $p < .001$). Latinas who prefer English and are foreign born have 31% reduced odds (OR = 0.69, $p = .004$) of meeting PA recommendations whereas Latinas who prefer Spanish and are U.S. born have 78% reduced odds of meeting both recommendations (OR = 0.22, $p = .005$). Among Latinas, Puerto Ricans and Dominican Republic immigrants are least likely to meet both of the 2008 PAG PA recommendations.

Acculturation is associated with the odds of Latinas engaging in PA. Those who preferred Spanish as interview language were least likely to meet the 2008 PAG; in most cases, foreign-born Latinas were less likely to engage in PA, regardless of the interview language. Compared with the most acculturated Latinas (English speaking, U.S. born), other Latinas generally had lower odds (OR < 1) of LTPA engagement. Independent of acculturation, are least likely to engage in LTPA. Yet in terms of acculturation, Puerto Ricans are well assimilated with 60% being born in the continental United States and speaking English in the NHIS interview, while immigrants from the Dominican Republic comprised 71% foreign-born individuals and 28% conducted the interview in Spanish.

Table 2 presents multinomial logistic regression models results, showing three mutually exclusive outcomes (meets strength recommendation only, meets aerobic recommendation only, meets strength and aerobic recommendations) compared with the reference category (meeting neither recommendation). Particularly, the comparison of Latinas, who meet both recommendations to those who meet neither, shows a strong social gradient (higher income + higher education are more likely to engage in both forms of LTPA), while working for pay, having a family member with physical or functional limitations, being pregnant, living with other adults or with children all reduce the odds of LTPA engagement. So does obesity (ORs between 0.38 and 0.76, $p < .34$), while meeting both PA recommendations is most common at the age of 37 (If the derivative of the quadratic age function is set to $\partial Y/\partial X = 0.1341129 - 0.00352X = 0$, $X = 37.3$), while declining afterward.

Discussion

The purpose of this secondary analysis was to explore the relationship between engagement in PA and acculturation and factors associated with acculturation among U.S. Latinas of childbearing age. Latinas were categorized by several factors (e.g., BMI, marital status, age group, income, education, citizenship/immigration status, country of birth, etc.). PA levels were determined by the PAG recommendations for adults.

The odds of participating in PA are influenced by many factors among Latinas of childbearing age. For example, higher income and higher education levels are associated with higher odds of childbearing Latinas engaging in LTPA indicating that these Latinas may have more

Table 2. Predictors of 2008 Physical Activity Guidelines Adherence Among Latinas (Reference Category: Meets Neither Recommendation).

	Meets only strength recommendation			Meets only aerobic recommendation			Meets both recommendations		
	OR	SE	p	OR	SE	p	OR	SE	p
Age	0.93	0.11	.527	0.96	0.04	.314	1.14	0.06	.012
Age (squared)	1.00	0.00	.483	1.00	0.00	.414	1.00	0.00	.024
Acculturation	Reference: English interview/U.S. born								
English preferred/foreign born	1.11	0.30	.706	0.87	0.10	.203	0.69	0.09	.004
English + Spanish/U.S. born	0.47	0.29	.226	0.70	0.15	.090	0.83	0.25	.533
English + Spanish/foreign born	0.99	0.33	.974	0.79	0.12	.126	0.53	0.10	.001
Spanish preferred/U.S. born	2.81	1.45	.046	0.71	0.18	.193	0.22	0.12	.005
Spanish preferred/ foreign born	0.73	0.25	.365	0.79	0.10	.050	0.30	0.05	.000
Country of origin	Reference: Mexican Americans/U.S. born								
Mexican immigrants	1.21	0.35	.517	0.93	0.11	.538	0.82	0.10	.121
Puerto Rican	0.65	0.24	.250	0.59	0.08	.000	0.50	0.08	.000
Cuban	0.01	0.00	.000	0.89	0.16	.522	0.86	0.21	.534
Dominican	1.28	0.48	.511	0.38	0.07	.000	0.41	0.11	.001
Central American	0.86	0.24	.585	1.00	0.10	.973	0.73	0.11	.042
Other	1.31	0.57	.536	1.29	0.23	.157	1.73	0.41	.021
Marital status	Reference: Married-partner in household								
Widowed	0.65	0.26	.277	1.12	0.16	.408	1.28	0.24	.183
Divorced/separated/not together	2.80	1.96	.141	0.89	0.34	.773	0.92	0.51	.879
Single	0.68	0.23	.263	1.00	0.12	.977	1.29	0.20	.097
With partner	1.16	0.38	.643	1.03	0.13	.795	1.38	0.25	.074
Income group	Reference: Less than 100% FPL								
100% < 200%	0.88	0.23	.611	1.03	0.10	.743	1.07	0.15	.644
200% < 400%	1.09	0.32	.764	1.36	0.14	.003	1.48	0.22	.008
400+%	1.55	0.57	.232	1.75	0.25	.000	2.38	0.42	.000
No info.	1.26	0.43	.482	1.10	0.16	.503	1.02	0.20	.918

Table 2. (continued)

	Meets only strength recommendation			Meets only aerobic recommendation			Meets both recommendations		
	OR	SE	p	OR	SE	p	OR	SE	p
Education	Reference: Less than HS								
Some HS	1.10	0.32	.748	1.11	0.14	.383	0.84	0.17	.377
HS degree	1.33	0.40	.344	1.36	0.18	.021	1.64	0.32	.011
Some college	1.58	0.52	.169	1.77	0.24	.000	2.55	0.55	.000
College degree	0.72	0.56	.677	1.84	0.28	.000	2.69	0.58	.000
Advanced degree	0.80	0.88	.841	2.32	0.53	.000	4.12	1.06	.000
Current work	Reference: Works for pay								
In school	0.65	0.36	.441	1.51	0.27	.019	1.43	0.29	.076
Disabled	0.46	0.33	.274	0.64	0.19	.128	0.56	0.20	.099
No work	1.00	0.53	.997	1.12	0.20	.522	1.06	0.28	.832
Family household	1.03	0.27	.919	1.45	0.14	.000	1.34	0.16	.013
Looking for work	1.40	0.41	.254	1.62	0.20	.000	1.91	0.30	.00
Limit. in Fam.	0.80	0.39	.650	0.78	0.14	.177	0.61	0.15	.050
Pregnant	0.26	0.19	.069	0.71	0.14	.087	0.32	0.10	.001
BMI category	Reference: Normal weight								
Underweight (BMI < 18)	1.08	0.71	.903	0.86	0.23	.570	1.02	0.34	.962
Overweight (25 ≤ BMI < 30)	0.88	0.18	.531	1.11	0.10	.263	0.91	0.10	.408
Obesity I (30 ≤ BMI < 35)	0.90	0.25	.708	0.99	0.09	.949	0.63	0.09	.001
Obesity II (35 ≤ BMI < 40)	0.90	0.32	.772	0.88	0.12	.373	0.53	0.12	.005
Obesity III (BMI 40+)	1.17	0.39	.633	0.98	0.17	.927	0.28	0.08	.000
Family type	Reference: One adult, no children								
2+ adults, no children	0.56	0.20	.104	0.64	0.10	.005	0.55	0.10	.001
1 adult, 1+ children	0.50	0.16	.030	0.63	0.09	.001	0.48	0.07	.000
2+ adults, 1+ children	0.35	0.13	.004	0.58	0.08	.000	0.47	0.08	.000

Note. OR = odds ratio; SE = standard error; FPL = federal poverty level; HS = high school; BMI = body mass index.

opportunities for LTPA. By contrast, other factors, including being obese, pregnant, living with others (children or adults), working for pay, reduce the odds that Latinas of childbearing age engage in LTPA. Familismo or the belief in family unity as being of greater importance than the individual and marianismo or the belief in the importance of meeting responsibilities toward others may combine to negatively influence Latinas participation in LTPA (D'Alonzo & Fischetti, 2008; D'Alonzo & Sharma, 2010). Marianismo beliefs and economic factors may also combine to negatively influence Latinas' PA engagement (D'Alonzo & Sharma, 2010). Consistent with these cultural influences is our finding that the main effect of family living arrangements on engagement in PA is the difference between single adult households and all others. Latinas, who live with others in larger households, are much less likely to engage in PA, even if the other household members are all adults. Those living as single adults are, incidentally, the most acculturated by our measure: some 84.5% of single Latinas conducted the NHIS interview entirely in English, 10% to 30% more than Latinas living in households with other family arrangements.

Our findings also demonstrate that Latinas are not a homogeneous group and should not be treated as such in research. Subgroups and countries of origins are important factors to recognize when investigating health disparities associated with PA participation and acculturation status. It is likely that cultural inheritances from a country of origin are stronger, if a person has lived in the United States only for a short while; however, in this analysis, we lacked a measure of time since immigration into the United States and could only use country of origin as a partial substitute. Acculturation being a complex phenomenon, it should be examined using more indicators than were available to us (e.g., language, country of origin, time spent in United States, religiosity, indices of traditionalism, etc.) to determine its effect in various subgroups of Latinos.

Results from the study show that, independent of poverty/income and competing obligations (work, school, family), acculturation status and country of birth seem to be associated with different levels of Latinas' PA engagement. Over 20 years ago, Abraído-Lanza and colleagues (2005) used NHIS data to show the complex nature of the associations of acculturation and lifestyle behaviors among Latinas and demonstrated that higher acculturation (measured by nativity/length of time in the United States and not including language preference) was positively associated with participation in PA; this association has not changed. What our study demonstrates is that acculturation involves not only more facets that must be taken into consideration, such as language preference, country of origin, but also lifestyles. Latinas, who prefer Spanish over English, were both less likely to be extremely obese and less likely to engage in the recommended levels of PA. This apparent contradiction suggests that acculturation among Latinas entails positive and negative trends. Possibly, more acculturated Latinas average greater calorie intake while becoming more physically active. This is consistent with the finding in the literature that more assimilated Latinos tend to switch in large numbers from home-cooked meals to fast food consumption (Ayala, Baquero, & Klinger, 2008).

Obesity rates are particularly problematic for Latinas of childbearing age, because of the association between overweight/obese mothers during pregnancy and the risk for their children to become overweight/obese (Hernandez-Valero et al., 2007). We found acculturation to be positively associated with extreme obesity. This finding is substantiated in the literature (Perez-Escamilla & Putnik, 2007). In addition, Latinas experience higher rates of obesity-related diseases than other population groups, highlighting an important health disparity and public health concern (Perez-Escamilla, 2011; Perez-Escamilla & Putnik, 2007). Sufficient PA participation as outlined by the PAG recommendations for adults is vital to reducing risks associated with being overweight and obese.

A major strength of this study is the use of a nationally representative sample of U.S. Latina residents. However, there are limitations in NHIS interview questions about PA that must be considered. The NHIS questions only refer to LTPA, and fail to address work or household PA, which is problematic because many low-income immigrants may have little leisure time due to socioeconomic pressures (D'Alonzo & Sharma, 2010). Occupational and household PA are important venues for PA for Latinas; they should be included in future research, given that Latinas may be more physically active in these activities (He & Baker, 2005) and may feel they sufficiently participate in PA through these venues, even though objective data suggest this is not the case (Casper, Harrolle, & Kelley, 2013). In addition, with interview data it is important to recognize the potential for socially desirable responses that might lead to exaggerations concerning PA participation.

Our findings highlight that few Latinas (13.3%) met both the 2008 PAG recommendations for muscle-strengthening activities and moderate aerobic activity. This means that for the other 86.7% of Latinas not meeting both the 2008 PAG, health care workers, nurses in particular, have much room for improvement in encouraging Latinas of childbearing age to engage in PA. Because of the strong associations between weight status and PA adherence among mothers and children, encouraging Latinas to engage in PA has implications that will likely impact the health of future generations. In addition, muscle-strengthening activities seem to have a low priority among Latinas, particularly among the least acculturated (born abroad and Spanish speaking). Future studies need to focus on family-oriented interventions to incorporate the reported effect of family type on LTPA in that living with other adults or children reduces opportunities for meeting national recommendations. Family-focused interventions are likely to incorporate cultural ideas of familismo and marianismo in a positive and encouraging manner for Latinas. Public health initiatives designed to increase PA and muscle strengthening among Latinas should include more tailoring for Spanish-speaking Latinas, especially if they are foreign born, and live in different family arrangements.

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