Acculturation and Physical Activity of US Men: Evidence from the National Health and Nutrition Examination Survey 2003-2006

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Abstract

We examine the association between acculturation and physical activity (PA) of male adults in the US using a nationally representative sample of 2,430 men 20-74 years old from the 2003-2006 National Health and Nutrition Examination Surveys. Unlike past studies relying on self-reported PA, we include and compare both subjectively measured PA (self-reported leisure PA, household PA, transportation PA, and total PA) and objectively measured PA (four measures based on different intensity thresholds and duration). We construct acculturation measures based on language use at home, nativity, and length of residence in the US. We find negative relationships between acculturation and objective PA measures and positive relationships between acculturation and subjective PA measures. The PA-acculturation relationships are moderated by race/ethnicity.

Key words: physical activity; acculturation; men; subjective measures; objective measures; race/ethnicity

INTRODUCTION

Immigrant health differentials are of great interest to public health because of their link to health disparities among the ethnic populations (Jasso, Massey, Rosenzweig, & Smith, 2004). The health of immigrants seems to decline as they become acculturated (Goel, McCarthy, Phillips, & Wee, 2004; Kaplan, Huguet, Newsom, & McFarland, 2004). Previous studies have suggested that the health deterioration can be attributed to the migration to a less healthy environment in the US, and/or the adoption to unhealthy behavior such as alcohol abuse, smoking, and overeating (Abraído-Lanza, Chao, & Flórez, 2005; Gordon-Larsen, Harris, Ward, & Popkin, 2003; Jasso et al., 2004; Unger et al., 2004). The relationship between acculturation and physical activity (PA), another important domain of health behavior, is yet less studied. Limited research in this area has provided some evidence of an increase in self-reported leisure-time physical activity (LTPA) and a decrease in non-leisure-time physical activity (NLTPA) as an individual becomes acculturated (Berrigan, Dodd, Troiano, Reeve, & Ballard-Barbash, 2006; Gerber, Barker, & Pühse, 2012; Kandula & Lauderdale, 2005).

Meanwhile, the trajectory of PA after immigration is likely complex, possibly moderated by gender and race/ethnicity (Wen, Kowaleski-Jones, & Fan, 2013). Men have higher levels of overall PA than women (Marquez & McAuley, 2006; Trost, Owen, Bauman, Sallis, & Brown, 2002), and they may exhibit distinct PA patterns with increasing acculturation. Such knowledge will help target policy interventions on specific subgroups. Most of past studies, however, have either treated gender as a control variable or focused on women in a specific racial/ethnic group (Gerber et al., 2012). Detailed gender-specific and racial-ethnically diverse research on the PA-acculturation relationship has not been adequately investigated, especially among the male adult population. Men have a shorter average life expectancy than women (OECD Health Statistics 2013). Although recent decades have witnessed an increase in the average life expectancy among males, the disparities still exist between white and non-white males (Hayward and Heron, 1999).

Given the effectiveness of PA in reducing the risk of premature mortality (US Department of Health and Human Services, 1996), there is a need to examine the change in PA with increasing acculturation among US men to shed light on the health disparities among racial/ethnic groups. In addition, the PA-acculturation relationship may be different depending on PA measures, as past studies have found group differences to vary depending on whether PA

is objectively or subjectively measured, and how they are measured (J. X. Fan, Wen, & Kowaleski-Jones, 2014). The literature on PA and acculturation is largely based on self-reported PA measures, which are subject to recall bias and/or social desirability bias (Wen et al., 2013). This study will add knowledge to the PA-acculturation relationship by incorporating objective PA measures, and by investigating the moderating effects of race/ethnicity. More specifically, the purpose of this study is to examine and compare the differences in four subjective and four objective measures of PA with acculturation using a nationally representative US male sample of racial-ethnically diverse population.

LITERATURE REVIEW

The acculturation of immigrants is generally defined as the process of cultural modification from the contact with different cultural backgrounds (Lopez-Class, Castro, & Ramirez, 2011; Sam, 2006). Measures of acculturation include place of birth/nativity (foreign- or US-born), length of residence in the US, generational status, language use at home and proficiency, cultural participation, social relation, and ethnic-specific acculturation scale measures (Gerber et al., 2012; Salant & Lauderdale, 2003). For PA, most studies rely on self-reported LTPA and some also use self-reported NLTPA or the intensity of PA. These studies have provided some evidence of an increase in LTPA with acculturation (Gerber et al., 2012), and a decrease in NLTPA with increasing acculturation among Asian and Hispanic immigrants (Berrigan et al., 2006; Kandula & Lauderdale, 2005). The self-reported measures, however, are subject to recall and social desirability biases (Wen et al., 2013). Further, it is possible that the perception and estimation of PA intensity and duration vary by different cultural backgrounds. Two out of the three studies using objective measures of PA focusing on a specific racial/ethnic group with small samples have not found a significant association between acculturation and PA counts (Chen, 2009; Marquez & McAuley, 2006). The third study (J. X. Fan et al., 2014) examined objective PA using a nationally representative sample while controlling for the place of birth of individuals in the analysis. They found that the foreign-born were more physically active than the US-born based on the objective PA measures, but the foreign-born reported less PA than the US-born counterparts. Since self-reported and objective PA measures are

independently associated with distinct biomarkers, Atienza et al. (2011) recommended the inclusion of both measures to capture a fuller picture of PA.

The gender differences in the PA-acculturation relationship are not conclusive in previous studies, and male-specific research in this area is far less explored relative to the focus on women. A few studies found that PA increased with acculturation among women but no significant results were found among men (Abraído-Lanza et al., 2005; Dawson, Sundquist, & Johansson, 2005). For female-specific studies, some found that PA increased with acculturation (Evenson, Sarmiento, & Ayala, 2004; Jessie X Fan, Kowaleski-Jones, & Wen, 2013; Slattery et al., 2006), while others failed to find any relationship (Wilbur, Chandler, Dancy, & Lee, 2003; Yang et al., 2007). Among the 44 PA-acculturation studies reviewed by Gerber et al. (2012), only one focused on men using a locale-specific sample and no association between PA and acculturation was found in that study (Méjean, Traissac, Eymard-Duvernay, Delpeuch, & Maire, 2009).

In sum, self-reported PA measures dominate extant studies on PA-acculturation relationship. A large number focused on a specific racial/ethnic group, women, or a small sample. The PA-acculturation relationship has not been adequately explored among males. In this paper, we include both subjective and objective measures of PA and examine their associations with acculturation among US men using a nationally representative sample.

METHODS

Data

The NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the United States (Centers for Disease Control and Prevention, 2003-2006). Since 1999, the survey examines a nationally representative sample of about 5,000 individuals each year. A complex, multistage, probability sampling design is used to select participants who are representative of the civilian, non-institutionalized US population. The NHANES survey is unique in that it combines interviews and physical examinations. In 2003-2006, both subjective and objective PA data were collected. For objective PA data, NHANES participants age 6 and older who could walk received accelerometers (Actigraph 7164, LLC, Ft. Walton Beach, FL) to wear at home for 7 consecutive days. Subjective PA data were collected in

the interview module that included an extensive array of questions related to daily activities and detailed information about specific leisure-time activities. For our study, we focused on male adults age 20 and 74 because past studies have shown that adult PA did not significantly decline until about 75 (Jessie X Fan, Kowaleski-Jones, et al., 2013). We exclude individuals who are not able to be physically active, who are pregnant, or whose accelerometer data are not valid (defined later). We only include individuals with non-Hispanic white, non-Hispanic black, or Hispanic identities because of the small sample in the other race group. Therefore, we have 2,430 male respondents in the analytical sample, which is described in Table 1.

Measures

For *objective PA measures*, Troiano et al.'s SAS macro processing NHANES accelerometer data is utilized (Troiano et al., 2008). While Troiano et al. used 2,020 counts per minute (CPM) as the moderate intensity threshold, other studies using the NHANES have also used a lower threshold of 760 CPM to include life-style PA (Camhi, Sisson, Johnson, Katzmarzyk, & Tudor-Locke, 2011; Jessie X Fan, Brown, et al., 2013; Strath, Holleman, Ronis, Swartz, & Richardson, 2008). We create measures for both CPM thresholds because it has been speculated that some of the objective-subjective PA differences could be attributed to people including lower-intensity PA as moderate-to-vigorous PA (Troiano et al., 2008). Further, in addition to the modified 10-minute continuous PA bout requirement consistent with the PA Guidelines, we compute short-bout PA that is more than 1 minute but less than the required 10-minute bouts for both intensity thresholds as misjudging PA duration can be another contributor to the objective-subjective PA disparity. In total there are four types of objective PA measures: (1) higher-intensity threshold long bouts of ≥10 min and ≥2,020 CPM representing the CDC recommendation, (2) higher-intensity threshold all bouts ≥ 1 min and ≥2,020 CPM, (3) lower-intensity threshold long bouts of ≥10 minute and ≥760 CPM, and (4) lower-intensity threshold all bouts of ≥1 minute and ≥760 CPM.

Four days of 10 or more hours of accelerometer wear are required for the accelerometer data to be considered valid. Non-wear time was define by ≥ 60 consecutive minutes of zero activity intensity counts, allowing for 1-2 minutes of <100 CPM. Wear time is defined by 24 hours minus non-wear time (Centers for Disease Control and Prevention, 2007). Weekly PA

minutes are computed for each of the four measures by multiplying average daily PA minutes by seven.

For *subjective PA*, the NHANES asks duration and frequency questions regarding leisure PA, household PA, and transportation PA. For leisure PA, NHANES collect data on 48 types of moderate-to-vigorous activities over the past 30 days, with detailed information on number of times and average duration of activity in minutes. For the purpose of this study, leisure activities are grouped together to form one measure. For household PA, NHANES respondents are asked if and for how long they have done any home tasks over the past 30 days that require moderate or greater physical effort. For transportation PA, NHANES respondents are asked if and for how long they have walked or bicycled as part of getting to and from work, or school, or to do errands in the past 30 days. Minutes in these three categories are added up to form a total PA measure. All subjective PA measures are converted to average minutes per week.

The acculturation measure includes two sets of proxy variables. The first one is a dichotomous variable indicating whether an individual speaks English at home. The second one includes three dichotomous variables indicating whether an individual is a foreign-born adult residing in the US for less than 10 years, a foreign-born in the US for 10 or more than 10 years, or a US-born adult.

We also control for the demographic, socioeconomic, and environmental characteristics of individuals, including age, race/ethnicity, education, income-to-poverty ratio, employment status, homeownership, marital status, health, and the month of data collection.

Models

We conduct analyses using SAS 9.2 and procedures that correct for the complex sampling design of NHANES as recommended (NHANES, 2005). Sample weights are adjusted for combining 2003-2004 and 2005-2006, and for four days of valid accelerometer wear, following Troiano et al (Troiano et al., 2008). We use domain analyses correcting for sampling design to obtain PA estimates first for different racial-ethnic groups by acculturation status (SAS Institute Inc., 2013). We use Wald chi-square tests to compare PA and demographic variables by

racial-ethnic status and acculturation status. To adjust for variations in demographic variables, multiple regressions are conducted with demographic and socioeconomic controls.

Denoting the acculturation variables as the vector **A** and control variables as the vector **X** for each individual (*i*), we specify the model as:

$$PA_i = \alpha_0 + \alpha_1 A_i + \alpha_2 X + \varepsilon_i$$

We also interact racial/ethnic indicators (**R**) with acculturation in order to examine the differences in PA among racial/ethnic groups as the individual becomes acculturated.

$$PA_i = \beta_0 + \beta_1 A_i + \beta_2 R_i + \beta_3 A_i \cdot R_i + \beta_4 X_i + \upsilon_i$$

RESULTS

Table 1 reports the weighted descriptive results of the sample by acculturation measures. The weighted averages of objective PA measures seem to describe a pattern of decline in PA with increasing acculturation. Individuals who do not speak English at home are physically more active than those who do, regardless of the intensity thresholds and length of bouts. Foreign-born men are physically more active than US-born men. Immigrants who have stayed in the US for less than 10 years (recent immigrants) have higher levels of PA than those who have stayed in the US for 10 years or longer (established immigrants).

The self-reported PA measures, however, show an opposite pattern. English speakers at home report more time on total PA than non-English speakers on average. Such result holds for all subcategories of PA. US-born men report higher levels of all subcategories of PA relative to foreign-born men. Established immigrants report higher levels of total PA than more recent immigrants. For specific subcategories of PA, established immigrants report more household and transportation PA than recent immigrants with low acculturation. The subjective measures indicate that, on average, men spend more time on PA with increasing acculturation.

The above descriptive patterns generally hold after we control for the socio-demographic characteristics of individuals presented in Table 2. For objective PA measures except for the high intensity long bout PA (≥10 minutes bouts ≥2,020 CPM), those who do not speak English at home have higher levels of PA than English speakers. Although we do not find a significant

result between acculturation and self-reported total PA minutes, acculturation measures are significantly associated with specific types of PA. For example, individuals who do not speak English at home spend about one hour less per week on household PA compared with their counterparts who do. Recent immigrants spend about half an hour less per week on transportation PA than the US born counterparts. With respect to race/ethnicity, Hispanic men are more active than non-Hispanic white counterparts based on accelerometer counts; however, results using self-reported PA do not confirm the differences between the two groups.

We also examine the moderation effects of race/ethnicity presented in Table 3. Across different objective PA measures, larger positive associations between being non-English speakers at home and high levels of PA exist among Hispanic men relative to their non-Hispanic white counterparts. More specifically, no significant differences are found between non-English and English speakers at home in PA counts among the non-Hispanic white. However, Hispanic non-English speakers spend 74 minutes more per week in high intensity threshold long bouts duration PA ((≥10 minutes bouts ≥2,020 CPM) and five more hours per week in low intensity threshold PA (≥760 CPM), compared with Hispanics who speak English at home. Similar results are found with subjective PA. For example, non-Hispanic white immigrants who do not speak English at home report spending about five hours less per week in total PA than their white counterparts who do. Hispanic immigrants who do not speak English at home report one more hour per week in total PA relative to Hispanic men who do. However, we do not find significant racial/ethnic differences in moderating the relationship between acculturation and specific PA categories.

The results for control variables are mostly consistent with previous studies. For example, older men engage in less PA, but they spend more time on household PA. Higher income-to-poverty ratio is associated with high levels of PA. Poor health is generally associated with fewer minutes of PA.

DISCUSSION

The PA-acculturation relationship among US men depends on the PA measures of use. Objectively measured PA decreases while subjectively measured PA increases with increasing acculturation. This primary finding is consistent with the PA patterns of the foreign-born versus

US-born found in J. X. Fan et al. (2014). We will discuss the possible reasons contributing to the discrepancy in PA-acculturation relationship using objective versus subjective PA measures. One argument is that self-reporting tends to overestimate the true level of activity and individuals can misclassify light intensity PA as moderate intensity PA (Atienza et al., 2011; J. X. Fan et al., 2014). This might be especially true for English speakers, US-born, or established immigrant men since they are more susceptible to the social desirability tendency and/or the Lake Wobegon effect in the American society, compared with the less acculturated. Social desirability is the tendency of individuals to describe themselves in a favorable manner to the perceived cultural norms (Adams et al. 2005; Hebert et al. 1997). Adams et al. (2005) has found some evidence of overestimating the PA level due to social desirability tendency. The Lake Wobegon effect is the tendency to overstate achievements (Maxwell and Lopus 1994). Although it has not been tested in the PA literature, the American culture of positive thinking and self-esteem building possibly contributes to the overstatement of the PA levels among highly acculturated individuals. Meanwhile, the discrepancy can also be the artifact of different scopes of the PA measures. The objectively measured moderate-vigorous PA does not include activities that only involve upper-body movements such as swimming. Our self-reported PA measures do not include occupation PA, which is captured by accelerometers. This exclusion may explain the contradictory results from subjective and objective measures if immigrants are more likely to be in PA-intensive occupations such as construction.

Based on objective PA, we find negative associations between PA and acculturation. Combined with the increase in other risky health behavior such as overeating, smoking, and alcohol abuse (Abraído-Lanza et al., 2005; BERMÚDEZ, Falcon, & Tucker, 2000), the decrease in PA with acculturation calls the attention on interventions for immigrants to maintain their healthy behavior. We also find interesting patterns in self-reported PA among the less acculturated population. Non-English speakers report less household PA than English speakers. It is possible that immigrant men do not engage in household tasks due to traditional gender roles in their home country to the extent as US-born men do. This argument is supported by the finding of less time spent on household work by immigrant men compared with the native born men in the time use research (Ribar, 2012). It is also possible that non-English speakers do not engage in do-it-yourself household tasks such as fixing the house or mowing the lawn as much as

counterparts who speak English at home since the English instructions in manuals might be difficult for the former group to comprehend.

The PA-acculturation relationships are moderated by race/ethnicity. For non-Hispanic white, we find a positive PA-acculturation relationship in total PA, whereas no significant association is found using PA counts. It is likely that the non-Hispanic white are more likely to overestimate their PA for the reasons discussed earlier. For Hispanics, we find consistent results of a decline in objectively measured PA as they become acculturated based on the measure of language spoken at home. For self-reported PA, previous studies found an increase in leisure-time PA and a decrease in non-leisure PA (Abraído-Lanza et al., 2005; Crespo, Smit, Carter-Pokras, & Andersen, 2001).. This study does not provide contradictory results, although our findings about leisure and household PA are marginally significant. Regardless, our findings about racial/ethnic differences imply that native language used in health education materials is important to maintain and promote active lifestyle among immigrants (Crespo et al., 2001).

LIMITATIONS

This study has several limitations. The data do not allow us to explore other acculturation measures except for two indicators based on language use at home, nativity, and length of stay in the US. These indicators have been critiqued in the public health literature due to their insufficiency to capture diversity in acculturation across individuals, the assumption of a linear trend in the acculturation process (Gerber et al., 2012). Future studies should adopt other measures such as multidimensional scales to verify the findings of this study. Although we find differences between non-Hispanic white and Hispanic men, we do not have enough samples to examine minority groups such as Asians and compare with the findings from previous studies such as Afable-Munsuz, Ponce, Rodriguez, and Perez-Stable (2010); Kandula and Lauderdale (2005). We also assume the homogeneity of characteristics within each racial/ethnic group, and therefore, we are not able to explore specific groups based on country of origin as studies such as Crespo et al. (2001), Ham, Yore, Kruger, Moeti, and Heath (2007), Allen et al. (2014), and Lee, Chen, He, Miller, and Juon (2013). Some of these studies, however, tend to be in small scale and locale-specific. We also do not include in the model the socio-cultural context of individuals such as stress, support, and discrimination and these factors might mediate the PA-acculturation

relationship (Allen et al., 2014). Also, our subjective PA measures do not include occupational PA, which can be a big component of total PA especially among immigrants.

CONCLUSION

We investigate the association between PA and acculturation of US men and use both objective and subjective measures of PA. We find negative relationships between acculturation and objectively measured PA and positive relationships between acculturation and subjectively measured PA. The PA-acculturation relationships are moderated by race/ethnicity.

Previous studies largely rely on self-reported PA measures, based on which we would conclude an increase in health benefits from PA as immigrants become acculturated. We find, on the contrary, the PA levels decrease with increasing acculturation based on the objective PA measures. This finding highlights the needs to allocate resources to target immigrant men, especially Hispanic immigrant male adults, and help them maintain or increase the PA levels as they become acculturated.

This paper is innovative in the following three aspects: (1) we use both subjective and objective measures of PA, (2) we include and compare different racial/ethnic groups using a nationally representative male sample in the US, which adds knowledge to the literature of health disparities among racial/ethnic groups, and (3) we conduct gender-specific analysis and focus on men in this paper, which provides insights for targeted policy interventions.

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Table 1. Weighted Descriptive Statistics on Physical Acitivity and Other Variables for US Men.

	English		no English		US-born		FB ≥10 year		FB <10 year	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Objective PA measures (min/wk):										
PA in 10 min bouts ≥2,020 CPM	57.6	3.7	81.0	7.1	56.7	3.5	69.0	10.2	93.3	12.7
PA in any bout length ≥2,020 CPM	222.5	5.7	324.6	15.0	220.7	5.6	267.7	18.5	352.0	23.5
PA in 10 min bouts ≥760 CPM	383.3	9.1	711.1	49.0	380.9	9.8	536.6	45.9	733.9	59.7
PA in any bout length ≥760 CPM	987.5	15.1	1366.9	46.4	983.0	15.7	1172.8	52.2	1407.5	61.0
Subjective PA measures (min/wk):										
Total PA	467.9	22.4	212.5	20.0	473.8	22.6	281.9	30.3	239.6	30.2
Leisure PA	244.8	8.4	139.5	15.9	247.7	8.7	158.1	20.0	159.8	26.5
Household PA	175.9	16.7	46.8	7.6	177.8	17.3	94.5	22.6	57.4	17.2
Transportation PA	47.2	5.7	26.2	6.1	48.3	6.1	29.3	7.7	22.4	6.0
Demographic, SES and other										
Age (year)	43.8	0.5	38.3	0.9	44.0	0.5	42.5	0.9	32.8	0.8
Non-Hispanic white	82.2%	2.0%	17.6%	4.6%	84.2%	1.9%	29.4%	3.2%	24.9%	7.8%
Non-Hispanic black	11.8%	1.6%	5.9%	1.8%	11.7%	1.6%	7.9%	1.9%	9.7%	2.9%
Hispanics	6.1%	1.1%	76.5%	4.8%	4.1%	1.0%	62.7%	3.4%	65.4%	7.4%
Less than high school	11.0%	1.2%	56.5%	4.4%	11.2%	1.2%	35.5%	2.6%	46.6%	6.5%
High school graduate/some college	60.7%	1.5%	33.8%	3.8%	60.7%	1.5%	45.8%	4.2%	39.7%	5.9%
College education or more	28.3%	2.0%	9.7%	1.8%	28.2%	1.9%	18.7%	3.5%	13.6%	4.4%
Income-to-poverty (ratio)	3.4	0.1	1.8	0.1	3.4	0.1	2.6	0.1	1.9	0.2
Employed fulltime	66.8%	1.4%	73.8%	2.7%	65.7%	1.4%	76.9%	3.7%	79.7%	3.8%
Homeowner	74.2%	2.0%	40.5%	4.2%	74.6%	1.9%	61.6%	5.3%	30.9%	5.5%
Married/cohabitating	72.0%	1.6%	73.1%	3.3%	71.8%	1.7%	77.6%	3.7%	67.3%	4.4%
Data collected April-October	62.2%	4.2%	38.1%	7.0%	63.0%	4.3%	37.3%	6.5%	49.6%	8.0%
Poor health	13.8%	0.8%	34.3%	2.8%	13.8%	0.8%	27.8%	2.6%	27.2%	4.7%
N	2009		421		1884		368		178	

Notes: SD: standard deviation; FB: foreign-born.

Table 2. Regression Analysis for the Effects of Acculturation on Objective and Subjective Physical Activity (PA) Measures in Minutes Per Week.

	Objective PA												Subjective PA											
	PA, ≥10 min bouts ≥2,020 CPM			PA, any bout length ≥2,020 CPM			PA, ≥10 min bouts ≥760 CPM			PA, any bout length ≥760 CPM			Total PA			Leisure PA			Household PA			Transportation		
Variables	Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE	
Acculturation measures																								
No English	11.7	16.9		67.3	23.2	a	205.1	62.6	a	227.3	66.8	a	-76.7	50.9		-2.5	37.6		-61.7	28.6	b	-12.6	12.9	
Nativity and length of residence (US-born)																								
FB<10 years	23.8	19.2		29.3	30.0		58.1	68.6		46.0	74.2		-75.3	60.7		-56.9	45.1		14.5	45.0		-32.9	12.6	b
FB ≥10 years	9.7	17.4		2.1	25.1		-16.0	55.2		-22.7	57.6		-73.4	49.0		-47.5	22.4	b	-9.2	39.8		-16.7	11.8	
Race/ethnicity (non-Hispanic white)																								
Black	8.2	6.9		7.7	9.3		11.1	21.7		13.8	29.3		-10.4	48.4		35.9	28.0		-72.0	20.1	a	25.7	18.8	
Hispanic	9.9	8.7		34.8	17.7	c	124.4	42.1	a	162.5	47.9	a	-25.7	49.8		11.1	30.7		-34.6	28.0		-2.2	15.9	
Age	-0.8	0.1	a	-3.6	0.3	a	-4.8	0.7	a	-8.8	0.9	a	-1.4	1.2		-2.8	0.7	a	1.9	0.8	b	-0.4	0.5	
Education (high school)																								
< high school	2.9	5.0		-4.8	10.1		40.1	25.9		16.8	33.8		-104.4	45.9	b	-66.8	24.4	b	-58.5	16.3	a	20.9	26.1	
College	39.9	8.5	a	14.4	10.7		-67.2	20.8	a	-159.0	29.0	a	-52.9	39.2		18.4	23.5		-69.8	20.0	a	-1.5	9.1	
Income/poverty	4.5	1.6	a	6.2	2.8	b	-1.2	7.0		0.5	9.5		0.4	13.5		7.0	7.7		-3.7	8.7		-3.0	4.7	
Employed fulltime	-8.6	5.0	c	42.8	8.8	c	92.5	20.9	a	217.7	32.2	a	-97.8	37.6	b	-49.5	23.4	b	-31.8	24.0		-16.5	12.1	
Homeowner	-5.2	6.1		1.7	11.9		57.2	26.1	b	85.6	31.4	b	66.0	44.6		26.1	20.6		52.3	26.0	c	-12.4	13.4	
Married/cohabiting	-11.8	5.6	b	-6.3	9.9		-4.4	24.0		50.3	29.1	c	12.7	35.6		-33.6	22.1		66.4	19.7	a	-20.1	11.8	
Poor health	-5.1	7.2		-33.6	9.9	a	-90.9	21.8	a	-123.2	31.5	a	-101.8	33.6	a	-64.7	18.5	a	-16.1	21.7		-21.1	7.5	a
Data collected April-October	5.2	6.0		18.2	9.1	c	53.1	20.4	b	87.1	30.2	a	58.9	34.2	c	25.5	14.5	c	41.5	21.8	c	-8.1	11.8	
Intercept	77.5	11.9	a	317.5	17.7	a	479.9	41.4	a	1122.6	57.1	a	545.0	68.5	a	374.3	36.9	a	55.2	37.6		115.6	33.5	a

Notes: CPM: counts per minute; SE: standard error; FB: foreign-born. [a] P<.01, [b] P<.05, [c] P<.10

Table 3. Regression Analysis for the Effects of Acculturation on Objective and Subjective Physical Activity (PA) Measures in Minutes Per Week by Race/Ethnicity.

	Objective PA												Subjective PA											
	PA, ≥10 min bouts ≥2,020 CPM			PA, any bout length ≥2,020 CPM			PA, ≥10 min bouts ≥760 CPM			PA, any bout length ≥760 CPM			Total PA			Leisure PA			Household PA			Transportation		
Variables	Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE		Coef	SE	
Acculturation measures																								
No English	-29.9	18.6		13.7	43.1		-72.9	90.5		10.6	118.9		-204.6	94.4	b	-98.1	69.3		-112.8	61.7	c	6.3	10.3	
Nativity and length of residence (US-born)																								
FB<10 years	25.5	22.4		17.5	51.8		-23.4	109.0		-41.5	155.9		9.1	115.1		71.8	99.3		-10.4	53.3		-52.3	13.6	a
FB ≥10 years	42.1	28.1		36.5	42.9		97.8	111.5		58.8	113.8		-50.5	84.1		-45.8	32.8		7.7	79.0		-12.4	16.5	
Race/ethnicity (non-Hispanic white)																								
Black (B)	14.4	6.7	b	13.9	9.5		27.0	22.3		24.5	29.5		-18.6	49.6		37.3	28.9		-80.9	21.7	a	25.0	21.0	
Hispanic (H)	2.6	8.5		18.3	16.2		17.4	32.7		69.1	43.8		-10.5	66.4		17.4	46.7		-32.1	38.2		4.2	17.4	
No English*B	-8.3	23.6		3.3	51.0		179.5	136.5		119.2	151.0		-104.3	174.4		-20.2	92.2		-43.0	140.1		-41.1	24.3	
No English*H	73.7	20.1	a	88.4	49.6	c	408.3	106.6	a	318.1	128.7	b	264.1	120.9	b	178.9	97.7	c	105.8	61.8	c	-20.6	20.2	
FB <10years*B	-38.9	27.0		-34.2	55.2		-37.6	149.3		5.6	182.0		169.2	173.1		-114.7	115.9		240.6	169.4		43.3	36.6	
FB <10years*H	-3.1	26.9		26.7	62.8		197.8	149.7		198.1	199.0		-243.7	154.4		-228.6	127.9	c	-30.9	57.9		15.8	24.0	
FB ≥10 years*B	-49.0	27.8	c	-47.4	45.2		-200.6	127.2		-120.7	144.4		103.0	137.4		70.2	71.7		23.8	97.3		9.1	42.3	
FB ≥10 years*H	-50.0	27.0	c	-44.3	49.1		-89.5	131.9		-52.0	147.9		-125.5	98.1		-53.4	58.9		-57.4	81.6		-14.7	24.7	
Age	-0.7	0.1	a	-3.5	0.3	a	-4.7	0.7	a	-8.8	0.9	a	-1.4	1.2		-2.8	0.7	a	1.8	0.8	b	-0.5	0.5	
Education (high school)																								
< high school	-0.9	5.0		-10.1	9.7		15.9	23.9		-3.5	32.4		-109.2	46.4	b	-70.5	24.8	a	-60.2	16.9	a	21.6	27.1	
College	40.8	8.4	a	15.3	10.6		-65.2	19.6	a	-157.5	28.1	a	-52.7	39.6		18.6	24.0		-70.0	19.9	a	-1.4	9.2	
Income/poverty	4.5	1.6	a	6.4	2.8	b	-0.3	6.8		1.4	9.5		1.0	13.4		7.4	7.6		-3.4	8.6		-3.0	4.7	
Employed fulltime	-9.4	5.1	c	41.8	8.6	a	87.0	20.7	a	213.2	32.0	a	-102.7	38.1	b	-52.8	23.4	b	-33.7	24.1		-16.1	12.4	
Homeowner	-5.6	6.1		1.0	11.8		53.2	25.4	b	82.0	30.6	b	65.9	44.4		26.6	20.6		51.7	25.4	c	-12.3	13.3	
Married/cohabiting	-12.2	5.4	b	-6.8	9.6		-6.4	23.4		48.4	28.8		11.9	35.0		-33.7	21.2		65.8	19.7	b	-20.2	12.0	
Poor health	-5.1	7.2		-33.7	10.1	a	-89.9	21.7	a	-122.6	32.4	a	-102.2	32.5	a	-63.1	18.3	a	-17.3	20.6		-21.8	7.6	a
Data collected April-October	6.4	6.0		19.5	9.1	b	57.5	20.2	a	90.5	30.3	a	58.3	34.1	c	25.1	14.3	c	41.2	22.2	c	-8.0	12.0	
Intercept	76.4	11.4	a	317.0	16.9	a	482.6	39.6	a	1126.0	56.5	a	551.0	69.4	a	375.2	37.9	a	60.2	38.3		115.7	34.3	a

Notes: CPM: counts per minute; SE: standard error; FB: foreign-born. [a] P<.01, [b] P<.05, [c] P<.10