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Contents

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Education and Racial-Ethnic Differences in Types of Exercise in the United States

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Abstract

Epidemiological research typically focuses on the intensity, frequency, or duration of physical activity, without consideration of the socially meaningful dimensions of exercise. The authors use data from the 1998 National Health Interview Survey (*N* = 17,455) and information on participation in 15 exercise behaviors to examine educational differences in exercise among non-Hispanic whites, non-Hispanic blacks, and Mexican Americans. Factor analysis identifies three types of exercise: team sports (e.g., basketball, football), fitness activities (e.g., running, weight lifting), and activities that require the use of specialized facilities (e.g., golf, tennis). Cultural capital and human capital perspectives offer insight into different dimensions of the relationship between education and exercise. Whites disproportionately undertake facility-based exercise, blacks tend toward team and fitness activities, and Mexican Americans gravitate toward team sports. Our findings offer insight into the social stratification of health and can aid the design of public health interventions.

Keywords:

education, health lifestyles, physical activity, race-ethnicity, social stratification

Epidemiological research on physical activity typically focuses on energy expenditure—as indicated by the intensity, frequency, or duration of physical activity—and finds that more active individuals have better health and lower risks of death (Blair et al. 1992). But a narrow focus on the link between energy expenditure and health overlooks the socially meaningful aspects of exercise. Individuals do not simply "expend calories," but rather, they accomplish physical activity through meaningful behaviors that reflect their identities and social circumstances, such as participating in sports or athletic activities, walking or bicycling for transportation, or working in strenuous occupations. Our study focuses on the stratification of leisure time exercise, which can aid efforts to promote health in the United States.

Education and race-ethnicity are important markers of social position in the United States that have established relationships with physical activity. Compared to whites and more educated individuals, blacks, Hispanics, and less educated individuals exercise less often (U.S. Department of Health and Human Services 2000). Less is known about education and racial-ethnic differences in participation in particular kinds of exercise, which is important for three reasons. First, insight into disparities in socially meaningful types of exercise can inform interventions that aim to increase physical activity and improve health outcomes. Evidence of racial-ethnic and educational differences in types of exercise would suggest the importance of tailoring interventions to particular subpopulations. Second, types of exercise may vary in their ability to improve strength, control weight, or increase cardiovascular fitness.

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Groups who disproportionately undertake types of exercise that routinely lead to injury or require intense physical contact may be unable to sustain those behaviors in midlife or later life, leading to exercise disparities across the life course. Finally, understanding racial-ethnic and educational differences in specific types of exercise can illuminate how the stratification of society shapes health behaviors, one dimension of broader lifestyles (Bourdieu 1984; Weber 1958) and a key predictor of other life chances, including long and healthy lives. Thus, we focus on exercise patterns in a nationally representative sample of non-Hispanic whites (henceforth whites), non-Hispanic blacks (henceforth blacks), and Mexican Americans.

HEALTH LIFESTYLES AND TYPES OF EXERCISE

Exercise is a specific kind of leisure time physical activity that provides a valuable window into health lifestyles. Following Cockerham (2000:160), "health lifestyles are collective patterns of health related behavior based on choices from options available to people according to their life chances." Although health lifestyles result from individuals' choices, those choices are shaped by socioeconomic resources, social conditions, and cultural understandings (Bourdieu 1984; Cockerham 2000). Exercise involves planned, structured, and repetitive movements that typically increase energy expenditure and have physical fitness as one of its objectives; sports are a subset of exercise that typically involve defined rules of play and an element of competition (Caspersen, Powell, and Christenson 1985). Bourdieu's (1984) work shows that socially significant distinctions among lifestyles become apparent when focusing on behaviors that are practiced differently across social groups. Indeed, individuals can accomplish exercise in various ways, by swimming, running, playing basketball, and so on.

The social significance of exercise is apparent in two ways. First, while exercise is associated with health and physical fitness, individuals exercise for reasons that go beyond a narrow focus on health promotion, such as alleviating boredom, seeking challenges, honing skills, coping with stress, depicting status, expressing identities, shaping physical appearances, or spending time with family, friends, or colleagues (Bolin and Granskog 2003; Krueger and Chang 2008). Our study focuses on behaviors rather than attitudes, because Bourdieu (1984) suggests that individuals may be unaware of how social factors influence their motives for participating in certain activities.

Second, different types of exercise have diverse social meanings and implications for health. Activities such as aerobics and running emphasize fitness, boxing and wrestling emphasize combativeness, and soccer and basketball require teamwork (Bolin and Granskog 2003; Stempel 2005; Wacquant 2004). Some kinds of exercise have socially structured entry requirements, including access to material resources (e.g., facilities, equipment), cultural and geographic norms (e.g., lacrosse in the mid-Atlantic United States), and the need to acquire specific skills. Furthermore, the character of competition varies across sports in terms of the need for direct physical contact and the skills required to win. Even exercises that do not entail competition, such as aerobics, yoga, or weight lifting, rely on constellations of meanings that map onto different types of physical fitness, including maintaining or losing weight, cardiovascular fitness, gaining flexibility, or building strength and muscle mass (Bolin and Granskog 2003). Variation in the reasons for exercising or the implications of different types of exercise for health might result in differences in the types of exercise undertaken across education and racial-ethnic groups.

We focus on two dimensions of exercise. First, we use exploratory factor analysis to empirically identify the types of exercise that emerge from 15 activities that are available in our data. Although prior research suggests that there are socially important differences in types of exercise, that work has limited value for determining how specific behaviors might group together in the contemporary United States because it uses data from diverse countries and time periods (Bourdieu 1984; Scheerder et al. 2002) and relies on measures that combine potentially high- and low-status behaviors or that conflate watching and participating in sports (Stempel 2005; Wilson 2002). Second, we examine participation in the number of exercises of each type, which allows us to model whether individuals are likely to participate in any activities and, if so, the number of activities of a particular type.

Education and Types of Exercise

The literature presents two different perspectives on the relationship between education and exercise. First, the human capital perspectives suggests

that, ceteris paribus, individuals with more education are more likely to exercise and to participate in additional kinds of exercise because they are more knowledgeable about the benefits of exercise and are better able to maintain exercise regimens. Education promotes cognitive skills, including reasoning, logic, motivation, and judgment; builds a strong sense of personal control; and improves individuals' abilities to integrate health behaviors into a coherent health lifestyle and to put those lifestyles into practice (Mirowsky and Ross 2003). Highly educated individuals may also be able to better manage their schedules in ways that facilitate exercise (Mullahy and Robert 2008).

Research that uses a human capital perspective typically focuses on the frequency, duration, or intensity of physical activity rather than on specific activities. For example, Droomers et al. (1998) model the relationship between education and a dichotomous indicator of participation in any leisure time physical activity, including walking or cycling to shops, gardening, or sports participation. They find that psychosocial resources that are consistent with the human capital perspective—an internal locus of control, an openness to new ideas, greater feelings of emotional security, lower levels of nervousness, and taking an active role in resolving problems—explain roughly half of the relationship between education and physical activity.

The human capital perspective suggests that education will be associated positively with participation in all types of exercise. Individuals with greater cognitive resources, with a stronger sense of personal control, and who are better able to manage their time (Mirowsky and Ross 2003; Mullahy and Robert 2008) should be better equipped to participate in any type of exercise that is commonly practiced in the United States. Furthermore, because human capital encourages openness to innovation and new ideas (Droomers et al. 1998), education should also be positively associated with participation in a greater number of exercise behaviors.

Second, the cultural capital perspective suggests that highly educated individuals use lifestyles—including health behaviors and patterns of consumption—to reinforce their differences from lower-status individuals (Bourdieu 1984; Weber 1958). Formal education entails the acquisition of skills and knowledge but also affords individuals greater status and might be associated with tastes for particular kinds of exercise, due to their interactions with others within the family, at school, or in other social settings (Bourdieu 1984; DiMaggio 1982). Although more-educated individuals bring more material and psychosocial resources to bear on their health maintenance efforts, the cultural capital perspective suggests that high-status individuals might gravitate toward only some types of exercise.

Some differences in leisure and sports activities are consistent with the cultural capital perspective. Low-education groups may participate in sports that are characterized by direct physical contact and domination and displays of strength, energy, effort, or pain because they value the type of physical contact that is discredited by the dominant class (Bourdieu 1984). In contrast, high-status individuals might undertake activities that emphasize fitness, grace, and leaner body types, such as strenuous aerobic sports, moderate weight training, or competitive sports that limit physical contact (Bourdieu 1984; Scheerder et al. 2002; Stempel 2005; Wilson 2002). Stempel (2005) categorized various exercise behaviors as fitness (e.g., aerobics, running, swimming) or competition (e.g., golf, basketball, tennis, football) oriented, and found that education was positively associated with participation in both fitness and competitive activities, although the effect of education was weaker for competitive sports.

In contrast to the human capital perspective, the cultural capital perspective suggests that highly educated individuals will distinguish themselves from less educated individuals by choosing some exercise behaviors and avoiding others. Research on cultural practices finds that high-status individuals appreciate a diverse array of high-status and middle-status musical or artistic genres but avoid genres that are associated with low-status individuals (Bryson 1996; DiMaggio 1987; Peterson and Kern 1996; Peterson and Simkus 1992). Although we do not have an a priori assumption about what sports or athletic activities are high, middle, or low status, the cultural capital perspective does suggests that education should be positively associated with some (presumably high- or middle-status) activities but not with other (presumably lower-status) activities. Furthermore, high-status groups are "omnivorous" in their tastes and often participate in a greater variety of high- and middle-status activities than low-status individuals (Peterson and Kern 1996). Thus, we expect that education will be positively associated with the number of some, but not all, types of exercise.

Race-Ethnicity, Education, and Types of Exercise

There are black/white differences in some kinds of cultural and sports participation. There is little research regarding the leisure activities of Mexican Americans; indeed, we advance prior work by specifically examining Mexican Americans. Blacks are more likely than whites to participate in team sports, some fitness activities, and volunteer activities but are less likely to participate in outdoor activities, such as camping and hiking (Floyd et al. 1994; Stamps and Stamps 1985). Blacks and whites also engage in different cultural activities, even after adjusting for socioeconomic status (DiMaggio and Ostrower 1990; Peterson and Simkus 1992).

Racial-ethnic differences in school quality (Card and Krueger 1992; Roscigno and Ainsworth-Darnell 1999), the availability of recreational facilities across segregated communities (Giles-Corti and Donovan 2002), perceived constraints and historically limited leisure opportunities (Johnson, Bowker, and Cordell 2001; Kelly 1983), and social psychological processes related to collective ethnic identity (Hartmann 2000; Ogden and Hilt 2003; Wacquant 2004) are all likely to influence racial-ethnic differences in exercise behaviors. Authority figures, role models, and peers can encourage individuals to view sports as a form of cultural expression, a means for shaping racial identities, or the most effective way to pursue social mobility (Carrington 2010; Hartmann 2000; Ogden and Hilt 2003). Sports can also help marginalized groups deal with social disorder in their communities, while allowing them to resist (or sometimes reinforce) racial stereotypes (Carrington 2010; Wacquant 2004).

We also examine whether racial-ethnic differences in exercise behaviors vary with education. For example, racial-ethnic differences in exercise behaviors may narrow with increasing education. Although low-status blacks and Hispanics may be socially and economically marginalized, higher levels of education offer opportunities for better-paying work in more prestigious occupations, a greater likelihood of marrying a highly educated spouse, and the resources to live in safer and less segregated communities (DiMaggio and Mohr 1985; Iceland and Wilkes 2006). Higher levels of education may increase the incentives for blacks and Mexican Americans to acquire the cultural preferences of whites. Because success in many high-status occupations requires individuals to establish a base of relatively affluent clients (Grodsky and Pager 2001), highly educated blacks (and potentially Mexican Americans) may pursue leisure activities that facilitate meetings with prospective clients by offering access to the social settings that are enjoyed by high-status whites (DiMaggio and Ostrower 1990). Consistent with this perspective, Floyd and colleagues (1994) find that black/white differences in spending time in the outdoors, playing sports or games, enjoying fine arts, or participating in social activities close with increasing education.

In contrast, racial-ethnic differences in physical activity may widen with increasing education. Advancing education may result in competition among racial-ethnic groups, thereby leading blacks and Mexican Americans to pursue leisure activities that diverge from those of whites to maintain their racial or ethnic solidarity, bolster collective action, and increase their political power (DiMaggio and Ostrower 1990; Peterson and Simkus 1992). Furthermore, blacks have historically attended lower-quality schools than whites (Card and Krueger 1992), and blacks have less access to cultural resources at home or in school, and benefit less from those resources, than their white peers (Roscigno and Ainsworth-Darnell 1999). Thus, blacks (and potentially Mexican Americans) may receive fewer economic returns or different cultural returns to a given level of education than whites. Consistent with this perspective, DiMaggio and Ostrower (1990) find that black/white differences in performing arts attendance increase with education.

Aims

In sum, three aims guide our article. First, we will examine the relationship between education and participation in different types of exercise. Second, we will examine exercise differences among whites, blacks, and Mexican Americans. Finally, we will examine whether racial-ethnic differences in exercise close or widen with increasing education.

DATA AND METHOD

Our data come from the 1998 National Health Interview Survey–Sample Adult Prevention Module (NHIS-SAPM). The NHIS is a nationally representative survey that conducts in-person interviews, in English and Spanish, with all members of

sampled households (National Center for Health Statistics 1998). The SAPM asks a random sample of adults from the 1998 NHIS detailed questions about health and health behavior.

We limit the sample to adults ages 25 to 60. Adults younger than age 25 are likely to be attending school or to return to school to earn college, graduate, or professional degrees. Furthermore, older adults from earlier cohorts differ from those born more recently in terms of leisure and cultural preferences (DiMaggio and Ostrower 1990; Kelly 1983; Peterson and Simkus 1992), and exercise behaviors may also vary across cohorts. Older individuals may also be less able to participate in some activities due to age-related declines in health, regardless of their preferences for certain activities.[1] We exclude respondents from small racial-ethnic groups (i.e., Cubans, Puerto Ricans, Asians, Native Americans) as well as those who reported that they could not participate in any of the activities due to their weight (n = 573) or physical limitations (n = 3,784).[2] Our final analytical sample includes 17,455 respondents.

Variables and Measurement

The SAPM uses a yes/no question to ask about participation in 15 activities: "In the past 2 weeks (outlined on calendar), beginning Monday, and ending this past Sunday, have you done any of the following exercises, sports, or physically active hobbies . . . ?" The activities include walking, running, aerobics, stretching/yoga, weight lifting, cycling, stair climbing, baseball, basketball, volleyball, soccer, football, swimming, tennis, and golf. We excluded activities that had low levels of participation and strong regional or seasonal aspects (e.g., skiing). Respondents were coded as 1 if they participated in each activity and 0 otherwise.

We use the 15 dummy variables for the specific activities to create two sets of dependent variables. First, exploratory tetrachoric factor analysis with varimax rotation identifies exercise types from the 15 behaviors. We identify three factors, standardize them to have a standard deviation of 1, and add a constant so that the minimum value on each factor is 0. Second, we create three dependent variables that are the sum of the number of activities in which each individual participates, for each type of exercise. The count variables allow us to examine the predictors of the number of activities of a given type, a key element of the human and cultural capital perspectives.

There are important differences between the two sets of dependent variables. The factor scores provide a linear index of each respondent's adherence to a given factor, based on their behaviors, where all behaviors are weighted according to their factor loadings. The count variables incorporate less information about the underlying factors because they give equal weight to all exercise behaviors of a given type and zero weight to behaviors that are not of a given type. In return, the count variables allow us to differentiate between those who undertake no exercise of a given type and those who participate in one or more exercise behaviors of a given type.

Our key independent variables are education and race-ethnicity. Education is at the center of both human capital and cultural capital theories (Bourdieu 1984; Mirowsky and Ross 2003) and is coded continuously as the number of years of school completed (range 0 to 20). Race-ethnicity is coded as non-Hispanic white, non-Hispanic black, and Mexican American.

Our analyses include several control variables. Age is measured in years, divided by 10, so that our coefficients can be interpreted in terms of decades of age. We square the age variable because our data indicate that the relationship between age and exercise is monotonic but changes more quickly with increasing age (Greenland 1995). We exclude the linear term for age because neither our data nor prior research suggests a reversal in the relationship between age and exercise in the age range we examine. Sex is dichotomous. Census region and interview quarters are coded categorically to capture geographic and seasonal variation in exercise. Family income is adjusted for family size, divided by 10,000, and logged to reduce its skew (Krueger et al. 2003). Employment status is coded dichotomously as employed or not employed. We include a count of the number of income sources received, per family member, as a proxy for household wealth (Krueger et al. 2003).

Statistical Analyses

We use the following strategy to model the factors and the numbers of activities. First, we estimate a baseline model that adjusts for education, race-ethnicity, and the control variables. We adjust for family income, employment status, and the income portfolio in all models because we want to focus on the human capital or cultural capital dimensions of education rather than on the pecuniary returns to education that might also shape exercise patterns. A second model, for the factor scores only, further includes interactions between education and race-ethnicity to examine whether racial-ethnic differences widen or

Table 1. Varimax Rotated Tetrachoric Factor Loadings for 15 Exercises, U.S. Adults Ages 25 to 60, National Health Interview Survey 1998

Sport	Fitness	Team	Facilities
Walking	**.598**	−.139	.349
Running	**.603**	**.500**	.146
Aerobics	**.797**	.027	−.103
Stretching	**.803**	.236	.209
Weight lifting	**.728**	.407	.040
Cycling	**.570**	.171	.326
Stair climbing	**.747**	.107	.062
Baseball	.126	**.703**	.277
Basketball	.164	**.839**	.101
Volleyball	.207	**.660**	.203
Soccer	.163	**.686**	.165
Football	.101	**.813**	.100
Swimming	.320	.199	**.525**
Tennis	.218	.282	**.613**
Golf	−.014	.248	**.756**

Note: Factor loadings >.50 in bold.

close with increasing education. Interactions (not shown) between education and race-ethnicity were not significant in the models for the numbers of activities; perhaps due to computational demands.

We use linear regression to model the factors for the types of exercises and zero-inflated Poisson (ZIP) regression to model the count variables. Almost 40 percent of adults do not participate in any of the 15 activities. ZIP models assume that the population is composed of a mixture of two latent groups: those who will never participate in any activities and those who have a non-zero probability of participating in one or more activities, even if they are not observed to participate in any activity (Long and Freese 2006). ZIP models allow us to separately model nonparticipation and participation in the number of exercises of a given type, an important element of the human capital and cultural capital perspectives. The Bayesian information criterion shows that the ZIP model fits our data better than Poisson, negative binomial, or zero-inflated negative binomial models (not shown).

We use the National Center for Health Statistics' five publicly released multiple imputation data files for the socioeconomic variables (Schenker et al. 2006), because our data have relatively high levels of missing data for family income and, to a lesser extent, employment status and receipt of various income sources. STATA 10.0 software (StataCorp 2007) allows us to incorporate sample weights and to correct our standard errors for the multistage sampling frame used by the NHIS (National Center for Health Statistics 1998).

RESULTS

Table 1 shows the three factors that emerge from the exploratory factor analysis; we consider behaviors as part of a factor if they have a factor loading of .50 or higher. The first factor captures *fitness* exercises that do not require the participation of others and that promote cardiovascular fitness, greater flexibility, or strength. The seven fitness exercises include walking, running, aerobics, stretching, weight lifting, cycling, and stair climbing. The second factor captures five *team* sports that require the participation of others, including baseball, basketball, volleyball, soccer, and football, and that may sometimes take place in workplace or community leagues. Running also loads highly on the team factor, perhaps because many team sports entail running.[3] The third factor includes three *facility*-based exercises—swimming, golf, and tennis—that require access to specialized facilities, including swimming pools, tennis courts, and golf courses. Those facilities may require expensive club memberships or usage fees, but some communities provide public facilities at free or subsidized rates.

Table 2 presents means and standard deviations for the continuous variables and proportions for the dummy variables. We also present bivariate correlations with each of the variables and the team, fitness, and facility-based factors. The factors have means ranging from 1.97 for the fitness factor to 3.63 for the facility-based factor. Respondents average 13.5 years of education, and education is positively correlated with the fitness and facility-based factors but not with the team factor. Being white is negatively correlated with the team factor but is positively correlated with the fitness and facility-based factors. In contrast, being black or Mexican American is positively correlated with the team factor but is negatively correlated with the fitness and facilities factors.

Table 3 presents linear regression models that predict each factor with education and race-ethnicity, while adjusting for the other variables. Model 1 shows that education is negatively associated with the team sport factor. Compared to whites, blacks are .17 standard deviations higher and Mexican Americans are .11 standard deviations higher on the team sport factor, given that the dependent

Table 2. Descriptive Statistics and Correlations with Factor Scores for the Exercise Profiles, U.S. Adults Ages 25 to 60, National Health Interview Survey 1998

	Mean/ Proportion	Standard Deviation	Correlations with Factors		
			Team	Fitness	Facilities
Team factor	2.837	.009			
Fitness factor	1.972	.010	−.320*		
Facilities factor	3.625	.010	−.493*	.057*	
Team sports, number	.135	.004	.656*	.121*	.024*
Fitness exercise, number	1.327	.014	−.263*	.980*	.172*
Facilities–based exercise, number	.135	.004	−.076*	.141*	.727*
Education, years	13.510	.030	−.097*	.251*	.127*
Race-ethnicity					
Non-Hispanic white	.804	.004	−.097*	.066*	.128*
Non-Hispanic black	.120	.004	.067*	−.016*	−.102*
Mexican American	.032	.002	.070*	−.099*	−.074*
Male (= 1)	.495	.004	.245*	−.068*	.018*
Age in years/10	4.089	.009	−.151*	−.072*	.067*
Region					
Northeast	.201	.004	−.032*	.041*	−.005
Midwest	.277	.005	−.006	.004	.018*
South	.343	.006	.041*	−.084*	−.018*
West	.178	.004	−.010*	.055*	.006
Interview quarter					
Quarter 1	.249	.007	.007*	.047*	−.087*
Quarter 2	.249	.006	−.005	.006	.055*
Quarter 3	.249	.006	−.016*	−.006	.088*
Quarter 4	.252	.006	.014*	−.045*	−.060*
Family income equivalence	3.407	.009	−.068*	.160*	.119*
Employed (= 1)	.886	.003	.061*	.049*	.003
Income portfolio	1.657	.011	−.095*	.192*	.139*

*$p < .05$ (two–tailed tests).

variable has a standard deviation of 1. Model 2 includes the interactions between education and race-ethnicity. The coefficient for education indicates a negative relationship between education and the team sport factor for whites. However, the interaction terms indicate less negative relationships between education and team sport participation among blacks ($p < .01$) and Mexican Americans ($p < .10$). A Wald test indicates that the interaction terms for education by race-ethnicity are jointly significant ($p = .003$).

Figure 1 graphs the predicted values from model 2 for education and race-ethnicity while holding all other covariates at their means. Although the variable for the years of education range from 0 to 20, we graph the range from 8 to 16 years because it contains 89 percent of the respondents and is the range with the greatest overlap among whites, blacks, and Mexican Americans.[4] Education has a negative relationship with the team sports factor among whites but has a weaker negative relationship among Mexican Americans and a positive relationship among blacks.

Models 3 and 4 on Table 3 examine the fitness factor. Model 3 shows that each additional year of education is associated with a .07 standard deviation increase in the fitness factor. Compared to whites, blacks are .12 standard deviations higher on the fitness factor. The interactions in model 4 show that the slope for education is positive among whites and is not significantly different among blacks. But the slope for education among Mexican Americans is significantly less positive than among whites.

Models 5 and 6 on Table 3 show the linear regression coefficients for the facility-based exercise factor. Model 5 shows that a one-year increase

Table 3. Linear Regression Coefficients for the Exercise Profiles, U.S. Adults Ages 25 to 60, National Health Interview Survey 1998

	Team		Fitness		Facilities	
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Education	−.022***	−.026***	.066***	.070***	.027***	.031***
	(.003)	(.004)	(.004)	(.004)	(.003)	(.004)
Race-ethnicity (reference non-Hispanic white)						
Non-Hispanic black	.168***	−.239	.124***	.302*	−.210***	.236*
	(.030)	(.133)	(.029)	(.144)	(.024)	(.108)
Mexican American	.111*	−.031	−.009	.241**	−.101**	.040
	(.045)	(.088)	(.038)	(.085)	(.033)	(.076)
Education × Non-Hispanic Black		.031**		−.014		−.034***
		(.010)		(.011)		(.009)
Education × Mexican American		.014		−.026**		−.013
		(.009)		(.009)		(.007)
Sociodemographic variables						
Male (reference female)	.500***	.502***	−.198***	−.199***	.037*	.035
	(.017)	(.017)	(.018)	(.018)	(.018)	(.018)
Age/10, squared	−.016***	−.016***	−.012***	−.012***	.004***	.004***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Region (reference Northeast)						
Midwest	.035	.033	−.055*	−.053*	.026	.028
	(.025)	(.025)	(.026)	(.026)	(.027)	(.027)
South	.05	.049	−.134***	−.133***	.058*	.059*
	(.026)	(.026)	(.026)	(.026)	(.026)	(.027)
West	−.011	−.012	.121***	.121***	.052	.052
	(.029)	(.029)	(.029)	(.029)	(.029)	(.029)
Interview quarter (reference quarter 1)						
Quarter 2	−.035	−.035	−.061*	−.061*	.283***	.284***
	(.023)	(.023)	(.025)	(.025)	(.024)	(.024)
Quarter 3	−.041	−.041	−.093***	−.093***	.344***	.345***
	(.023)	(.023)	(.027)	(.027)	(.024)	(.024)
Quarter 4	.017	.016	−.159***	−.158***	.063**	.064**
	(.025)	(.024)	(.026)	(.026)	(.022)	(.022)
Family income equivalence	−.017	−.019	.072***	.072***	.059***	.061***
	(.012)	(.012)	(.013)	(.013)	(.013)	(.013)
Employed (reference not employed)	.131***	.128***	−.107***	−.106***	−.168***	−.165***
	(.026)	(.026)	(.030)	(.030)	(.026)	(.026)
Income portfolio	−.068***	−.067***	.130***	.129***	.097***	.096***
	(.010)	(.010)	(.011)	(.011)	(.011)	(.011)
Constant	3.185***	3.245***	1.125***	1.079***	2.773***	2.709***
	(.059)	(.062)	(.066)	(.070)	(.067)	(.073)

Note: Standard errors in parentheses.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$.

in education is associated with a .03 standard deviation increase in the facilities factor. In contrast to the findings for team and fitness factors, blacks and Mexican Americans both have significantly lower values on the facilities factor than whites after adjusting for other sociodemographic variables. In model 6, the coefficient for education indicates a positive relationship between education and the facilities factor for whites. However, the interaction terms are negative, indicating that the relationship between education and the facilities factor is weaker for blacks ($p < .001$) and Mexican

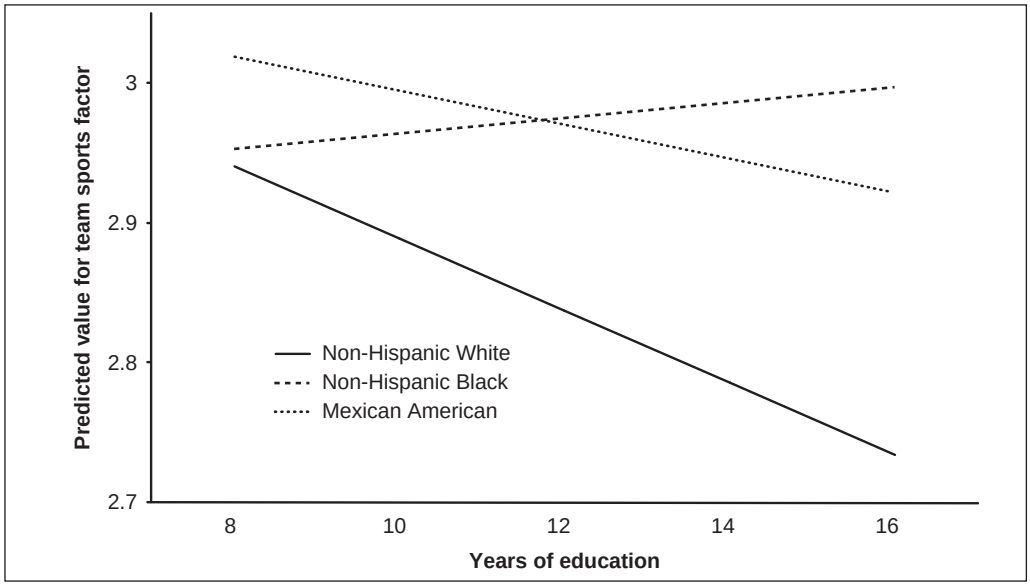

Figure 1. Predicted Team Sports Factor Score, by Race-Ethnicity and Education, from Model 2, Table 3

Americans ($p < .10$) than for whites. Figure 2 graphs the results from model 6. Education has a slightly negative relationship with the facilities factor among blacks, a modest positive relationship among Mexican Americans, and a stronger positive relationship among whites.

Table 4 presents the results from ZIP models for the number of exercise activities of a given type. The first column (labeled *inflate*) for each model presents coefficients for the logged odds that respondents will report zero activities. The second column (labeled *count*) presents Poisson regression coefficients for the number of activities for those who have a non-zero probability of participating in any activities.

In model 1, the inflate column shows that each additional year of education is associated with 11 percent (= $[1 - e^{-.112}]$*100) lower odds of participating in zero team sports. Furthermore, compared to whites, blacks have .61 ($=e^{-.488}$) times and Mexican Americans have .35 ($=e^{-1.056}$) times the odds of participating in zero team sports. The count column shows that education is not significantly associated with the number of team sports, but blacks are marginally ($p < .10$) more likely than whites to participate in more team sports.

In model 2, the inflate column shows that each additional year of education is associated with 13 percent ($[1 - e^{-.138}]$*100) lower odds of participation in zero fitness exercises, and Mexican Americans have higher logged odds of participating in zero fitness exercises than whites. The count column shows that each year of education is associated with a 4.9 percent ($[1 - e^{.048}]$*100) increase in the number of fitness exercises, and blacks participate in 12 percent ($[1 - e^{.116}]$*100) more fitness activities than whites.

In model 3, the inflate column shows that each year of education is associated with 24 percent ($[1 - e^{-.277}]$*100) lower odds of participating in zero facility-based activities. Blacks have 4.8 ($e^{1.561}$) times the odds of whites of participating in zero facility-based exercises. The count column shows that each year of education is associated with a 6 percent ($[1 - e^{.06}]$*100) increase in the number of facility-based exercises, and Mexican Americans are only marginally ($p < .10$) more likely to undertake fewer facility-based activities than whites.

DISCUSSION

In the U.S. population, whites and more educated individuals are more physically active than blacks, Hispanics, and less educated individuals (U.S. Department of Health and Human Services 2000). We advance prior work by focusing on socially meaningful exercise patterns rather than on measures of activity duration, intensity, or frequency that are often used by epidemiologists and that

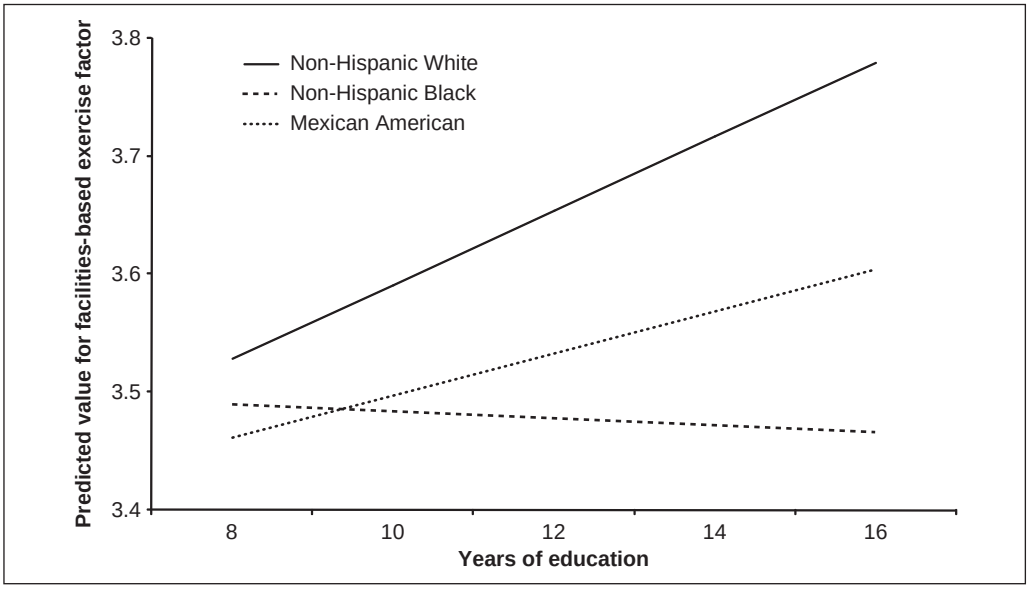

Figure 2. Predicted Facility-Based Exercise Factor Score, by Race-Ethnicity and Education, from Model 6, Table 3

typically confound leisure, work, and transportation behaviors. Health lifestyle theories emphasize that individuals' behaviors reflect their social, cultural, and economic circumstances (Cockerham 2000). Leisure is a primary domain in which individuals create meaningful lifestyles (Bourdieu 1984; Kelly 1983), and leisure time physical activity has become increasingly salient for health as jobs have become more sedentary and long commutes have become ubiquitous in recent decades (Berry 2007; Brownson, Boehmer, and Like 2005).

Our first aim draws on human capital and cultural capital theories to examine the relationship between education and the type and number of exercise activities. Consistent with the cultural capital perspective, the linear regression models show that education is positively associated with the fitness and facility-based factors but is negatively associated with the team sports factor. Cultural capital theory suggests that education shapes individuals' tastes for particular kinds of behaviors that reinforce status distinctions (Bourdieu 1984), leading highly educated individuals to gravitate toward some, but not all, exercise activities. Basketball courts and open spaces for playing baseball, soccer, and football are more common and better maintained in wealthy areas where more educated adults tend to live (Giles-Corti and Donovan 2002). Thus, less educated individuals overcome potentially substantial barriers to team sports participation and accrue types of cultural capital that value team sports (whether in pick-up games or in work or community leagues) that entail physical contact and displays of strength and energy and that emphasize competition and camaraderie (Bourdieu 1984; Scheerder et al. 2002; Stempel 2005; Wilson 2002). The results from the linear regression models failed to support the human capital perspective that more educated individuals should pursue all types of exercise due to their greater motivation, cognitive skills, and ability to maintain difficult exercise regimens (Mirowsky and Ross 2003).

The ZIP models suggest that the cultural capital and human capital perspectives explain different dimensions of exercise. In support of the human capital perspective, education is negatively associated with the odds of participation in zero team, fitness, and facility-based activities. That is, higher levels of education are associated with higher odds of participating in any of the three types of exercise. But consistent with the cultural capital perspective, more educated individuals behave like cultural omnivores (Peterson and Kern 1996) and pursue numerous high- and middle-status activities (presumably, fitness and facility-based exercises) but do not pursue numerous lower-status activities (presumably, team sports). The human capital perspective may be most useful for understanding whether individuals participate in *any* leisure time exercise, but the cultural capital perspective may be most useful for understanding *which* activities individuals undertake.

Table 4. Zero-Inflated Poisson Regression Coefficients for the Odds of Nonparticipation (Inflate) and the Number of Exercises (Count), U.S. Adults Ages 25–60, National Health Interview Survey 1998

	Model 1: Team		Model 2: Fitness		Model 3: Facilities	
Variable	Inflate	Count	Inflate	Count	Inflate	Count
Education	−.112**	−.024	−.138***	.048***	−.277**	.060***
	(.041)	(.026)	(.016)	(.004)	(.100)	(.014)
Race-ethnicity (reference non-Hispanic white)						
Non-Hispanic black	−.488**	.189	−.113	.116**	1.561*	−.328
	(.174)	(.110)	(.117)	(.036)	(.703)	(.320)
Mexican American	−1.056**	−.347	.419*	.042	.511	−.559
	(.467)	(.233)	(.170)	(.068)	(.916)	(.315)
Sociodemographic variables						
Male (reference female)	−1.436***	.335*	.422***	−.014	−1.478**	.439***
	(.193)	(.155)	(.072)	(.020)	(.472)	(.107)
Age/10, squared	.113***	−.003	−.008	−.018***	.028	−.018***
	(.011)	(.007)	(.005)	(.001)	(.031)	(.005)
Region (reference Northeast)						
Midwest	−.382	−.085	.071	−.030	−.154	.060
	(.202)	(.131)	(.112)	(.029)	(.637)	(.122)
South	−.328	−.169	.256*	−.087**	−.268	.242*
	(.213)	(.152)	(.106)	(.032)	(.587)	(.116)
West	−.290	−.024	−.255	.082**	−1.610*	.047
	(.226)	(.155)	(.130)	(.028)	(.718)	(.123)
Interview quarter (reference quarter 1)						
Quarter 2	−.262	.097	−.074	−.025	−.465	.838***
	(.213)	(.133)	(.106)	(.026)	(.871)	(.159)
Quarter 3	.049	.209	.050	−.042	−1.290	.989***
	(.226)	(.152)	(.110)	(.029)	(1.437)	(.205)
Quarter 4	.280	.087	.186	−.117***	1.489	.559***
	(.210)	(.146)	(.115)	(.032)	(.996)	(.161)
Family income equivalence	−.182	−.052	−.097	.080***	−.338	.222***
	(.122)	(.082)	(.051)	(.017)	(.188)	(.057)
Employed (reference not employed)	−.393	−.136	1.119***	.054	.632	−.141
	(.413)	(.369)	(.210)	(.041)	(.586)	(.151)
Income portfolio	−.071	.019	−.385***	.070***	−.524	.133***
	(.082)	(.050)	(.045)	(.012)	(.311)	(.038)
Constant	3.122***	−.201	.331	−.180*	4.375***	−4.112***
	(.615)	(.496)	(.302)	(.088)	(1.166)	(.381)

Note: Standard errors in parentheses.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$.

Our second aim examines racial-ethnic differences in types of exercise. Consistent with research on exercise and other leisure activities (Floyd et al. 1994; Stamps and Stamps 1985), the linear regression models show that compared to whites, blacks have higher values on the team and fitness factors, and Mexican Americans report higher values on the team sports factor. But blacks and Mexican Americans have lower values on the facility-based factor than whites. The ZIP models confirm the general trends observed in the linear regression models. Racial-ethnic differences in exercise behaviors may result from less access (or less perceived access) to tennis, golf, or swimming facilities or may reflect preferences for different types of exercise (Floyd et al. 1994; Giles-Corti and Donovan 2002; Ogden and Hilt 2003).

Our third aim was to examine whether racial-ethnic differences in exercise vary with education. Consistent with evidence that black/white differences

in performing arts widen with increasing education (DiMaggio and Ostrower 1990), we find that with increasing education, blacks diverge from whites for the team and facility-based exercise factors and that Mexican Americans diverge from whites for the team and fitness factors. We find no evidence of narrowing racial-ethnic differences in exercise with increasing education. Racial-ethnic differences may widen for several reasons. High-status minorities may seek to differentiate themselves from whites to maintain their racial and ethnic solidarity and to increase their political power (DiMaggio and Ostrower 1990; Peterson and Simkus 1992). Exercise and sports provide social contexts that allow groups to create social identities and resist (or sometimes reinforce) cultural stereotypes (Carrington 2010). Also, blacks and Mexican Americans typically attend poorer-quality schools than whites, where they may acquire less human capital per school year (Card and Krueger 1992), and have limited access to cultural resources that encourage high-status behaviors (Roscigno and Ainsworth-Darnell 1999). Finally, even highly educated blacks and Mexican Americans may live in segregated neighborhoods where preferences are shaped by the availability of recreational facilities (Giles-Corti and Donovan 2002).

Strengths and Limitations

Our study has several strengths. First, we use a nationally representative sample of adults ages 25 to 60 that includes questions on 15 common exercise behaviors, a greater number than has been examined in some prior studies (Scheerder et al. 2002; Wilson 2002). Second, our findings are consistent with research from several countries and across nearly a half century that shows that low-status groups more often undertake team sports that entail direct physical contact, whereas more educated individuals disproportionately pursue fitness activities (Bourdieu 1984; Scheerder et al. 2002; Stempel 2005; Wilson 2002). Finally, our analyses include Mexican Americans and use a survey that interviews participants in either English or Spanish.

Several limitations of our study also warrant mention. Our results provide valuable insight into the relationship between education and types of exercise, but our data do not include measures of cognitive orientations, attitudes, or beliefs that would allow a more direct test of the human capital and cultural capital theories. Concomitantly, our data do not include variables that allow us to explore the cultural orientations or access to exercise facilities that might explain racial-ethnic differences in participation in different kinds of exercise. Due to space limitations, we did not explore gender differences in types of exercise, although men and women have differential access to workplace exercise leagues and might apply different meanings to similar sports (Bolin and Granskog 2003).

Although these data are the best available for our analyses, they are more than a decade old. More recent data that ask detailed questions about exercise include fewer respondents (e.g., the National Health and Nutrition Examination Survey), which limits their ability to examine Mexican Americans. Our results are similar across age groups (see note 1) and are consistent with findings from other countries and other time periods (Bourdieu 1984; Scheerder et al. 2002; Wilson 2002), but future work with longitudinal data could better distinguish among cohort and age trends in exercise.

Conclusion

Our research specifically examines health behaviors (what people *do*) rather than health statuses (what people *are*) because behaviors can offer insight into how social factors are transformed into health outcomes. Our finding that education and race-ethnicity have different relationships with team, fitness, and facility-based activities emphasizes the varied social meanings of exercise behaviors. Ross (2000) makes a similar point when she finds that neighborhood poverty and education levels have different relationships with walking than with leisure time exercise. Broad measures of physical activity may be useful for examining the impact of caloric expenditure on obesity or mortality but provide limited insight into sociological concerns about how social factors shape meaningful health behaviors.

Our findings could aid the design of effective public health interventions to promote physical activity. Consistent with the human capital perspective, higher levels of education may prompt individuals to pursue any physical activity. But public health interventions might be more effective if they also recognize that members of different education and racial-ethnic groups gravitate toward certain types of exercise, either because of their limited access to recreational facilities (Giles-Corti and Donovan 2002) or because of different exercise preferences (DiMaggio and Ostrower 1990; Ogden and Hilt 2003). Furthermore, strenuous team sports that are more commonly practiced among blacks, Mexican Americans, and less educated individuals may be more difficult to pursue

in midlife and later life, potentially resulting in increasing exercise disparities across the life course. Widening racial-ethnic gaps in various types of exercise, with increasing education, may also illuminate the origins of racial-ethnic and educational disparities in other health outcomes.

Our findings also have implications for social stratification more broadly. Prior research shows that racial-ethnic and educational differences in leisure or cultural activities can reinforce distinctions between groups (Bryson 1996; Carrington 2010; DiMaggio and Mohr 1985; DiMaggio and Ostrower 1990). While differences in exercise behaviors may shape health promotion, different lifestyles might also have implications for outcomes that are more often studied in the stratification literature (Bourdieu 1984; Weber 1958)—such as earnings or the educational attainment of offspring—that have been linked to other leisure and cultural practices (DiMaggio 1982; DiMaggio and Mohr 1985; Roscigno and Ainsworth-Darnell 1999). Future research could examine whether some types of exercise are associated with cultural knowledge or social contacts that promote economic success. If so, then public health interventions might balance the importance of promoting various kinds of exercise in a diverse population with concerns about reinforcing social inequalities across education and racial-ethnic groups.

DECLARATION OF CONFLICTING INTERESTS

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NOTES

1. Sensitivity analyses also examined other age strata because individuals may continue their education after age 25, because age 60 may inaccurately capture the age at which physiological declines drive exercise practices, and to test for potential cohort variations in exercise patterns. Our substantive findings were unchanged for the age groups 30 to 60, 35 to 60, 25 to 55, and 25 to 65.
2. The Sample Adult Prevention Module does not ask respondents about their exercise activities if they say they cannot exercise because of their weight or physical limitations. Furthermore, weight and physical limitations are more common among those who are black, female, older, poorer, from the South, and less educated. We explore the possible biases this introduces into our analyses by comparing three sets of analyses. First, we dropped individuals who said they were unable to exercise. Second, we perform multiple imputation on the exercise variables with our model covariates and variables that are associated with reasons for nonresponse. Third, we set the exercise variables to zero for those who reported that they were unable to exercise. In all cases, our substantive findings were identical.
3. We include running with the number of fitness exercises because it loaded highest onto the fitness factor. Separate models (not shown) that also counted running among the number of team sports, given its relatively high loading on that factor, found substantively identical results.
4. We took several steps to ensure that our results are not driven by a few observations. First, we inspected the distribution of education by race-ethnicity. Although whites had the highest average levels of education, we found a reasonable number of blacks and Mexican Americans with college education. Second, we tested models that bottom- and top-coded education at 9 and 16 years, respectively; our substantive findings were unchanged. Finally, we examined our residuals and the leverage, dfbeta, and dfit statistics. Our results were unchanged when excluding the most influential observations and outliers from our models.

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