

Physical Activity Profiles, Education, and Race/Ethnic Disparities in Health Outcomes in the U.S.

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An inverse relationship exists between physical activity and social position. Individuals with low income, low education, and/or low SES have all been linked to lower levels of physical activity (Fletcher and Hirdes 1996; Johansson et al. 1988; Mensink, Loose and Oomen 1997; Wister 1996). Additionally, race/ethnic minorities report lower levels of physical activity (Crespo et al. 1996; Crespo et al. 2000; U.S. Department of Health and Human Services 1996). While the relationship between physical activity and social position is well established, the underlying mechanisms that shape physical activity are less well known. Furthermore, there is little information explaining the role of physical activity profiles on race/ethnic and SES health disparities. To this end, the aim of this research is two-fold: (1) to determine whether social positions such as race/ethnicity and education are associated with different types of physical activity profiles, and (2) to investigate the relationship between physical activity profiles and health outcomes.

Physical activity is associated with a broad array of physiologic and mental health benefits. Physical activity has positive biological links to health by lowering blood pressure, plasma fibrinogen, and plasma viscosity (Koenig et al. 1997; MacAuley et al. 1996). Physical activity decreases the risks of morbidity and mortality, with even small reallocations in time engaged in physical activities linked to better health (Blair et al. 1992; Kujala et al. 1998; Paffenbarger et al. 1986). For example, the amount of time spent in sedentary behaviors has been linked to lower levels of energy expenditures (Levine et al. 2005; Westerterp 2001), increased risk of heart disease (Berlin and Colditz 2004; Powell et al. 1987), increased risk of weight gain (Hu et al. 2003), and poor mental health (Moses et al. 1989; Paluska and Schwenk 2000; Raglin 1990).

All types of physical activity are associated with better health as determined by the total energy expenditure (Blair et al. 1992). Physical activity research is often focused on energy expenditure though an examination of the intensity, frequency, and duration of activity rather than on the specific types of activity (Pollock et al. 1998). But, a narrow focus on energy expenditure fails to recognize the association between overall fitness profiles, larger social processes, and health outcomes. For instance, race/ethnic and socioeconomic disparities in obesity, cardiovascular outcomes, and mental health may be due in part to differential patterns of engagement in physical activity.

Physical activity differs by social status, with lower social status groups engaging in less physical activity than higher status groups. Non-Hispanic blacks and lower SES individuals are more likely to be completely sedentary and to exercise less frequently than whites and higher SES individuals, respectively (Blair 1988; Holtzman et al. 2000; NcfH 2005; NCHS 2005). Building on theoretical insights of Bourdieu (1984a), Link and Phelan (Link and Phelan 1995) and Cockerham et al. (1997b), we suggest that health behaviors are intrinsically linked to SES and race/ethnicity through fundamental conditions that include customary norms and material resources, which subsequently shape routine practices. Although some studies have examined race and SES preferences in leisure time activities (Floyd and Shiner 1994), few studies have used large national datasets to identify and link unique activity portfolios to demographic trends in health.

Engagement in specific types of physical activities may represent unique activity profiles that represent larger cultural processes and serve as forms of social distinction. Given recognized relationships between SES, race/ethnicity, and activity types, it is probable that physical activity behaviors are associated with norms and group-related

pressures. These behaviors, shaped by shared experiences, resources, and options, reflect group-based tastes and preferences fashioned by social positions. Engagement in unique activity profiles may represent a source of social prestige used to distinguish social status and to maintain class distinctions (Bourdieu 1984b; Weber 1958).

Preferences in activity are likely to be organized according to the fundamental social structure (Bourdieu 1984b). The universe of physical activities maintains a set of traditions, rules, values, and symbols that are historically and socially defined.

For example, research suggests that lower SES groups choose sports characterized by high investments of energy, effort, or pain (i.e. contact-sports and team sports) due to the accessibility and potentially undesirable contacts discredited by the dominant class (Bourdieu 1984b). High status activities are often practiced in exclusive places, at specific times, and are defined by highly controlled social exchanges. High prestige activities may include explicit costs and hidden entry requirements such as prohibitive early socializing and training.

Physical activities may also differ by status group because of recognizable fitness gains. For instance, health-oriented behaviors such as running may be linked to high SES groups' tacit understanding of intangible health benefits. As such, preferences and tastes for physical activities may symbolically and physically comprise an important component of an overall health lifestyle (Cockerham, Rutten and Abel 1997a).

SES may influence individual health behaviors through occupational situations, social-psychological resources, and lifestyle decisions (Ross and Wu 1995). Education, a measure of social class, influences physical activity through problem solving capacity and values pertaining to health lifestyles (Liberatos, Link and Kelsey 1988; Montgomery

and Carter-Pokras 1993). While knowledge of the benefits of physical activity is commonplace, higher educated individuals may be better suited to engage in higher levels of physical activity (Mirowsky and Ross 2005; Ross 2000).

Researchers have also suggested the importance of race/ethnicity in prevalence and types of leisure-time activities (Floyd et al. 1994; Stamps and Stamps 1985). Evidence indicates race/ethnic variations in physical activities. For example, race/ethnic minorities are less likely to engage in leisure-time activities (Crespo et al. 1996; U.S. Department of Health and Human Services 1996), Mexican-Americans exhibit a higher prevalence of physical inactivity during leisure time than non-Hispanic whites (Crespo et al. 1996) (Crespo et al. 2001), and African-Americans have higher participation in team sports (Floyd and Shiness 1994).

There are also relationships between race/ethnicity, SES, and physical activity. For example, Crespo et al. (2000) find higher levels of physical inactivity among those with less education in all race/ ethnic groups with minority groups exhibiting less physical activity levels than non-Hispanic whites in almost every education category. While race/ethnic leisure-time inactivity differences are inextricable from social class (Shea et al. 1991), measures of social status are unable to completely explain the higher prevalence of inactivity for race/ethnic minorities (Crespo et al. 2000). Although the causal pathways linking racial and ethnic differences in health status are not clearly defined, groups that experience poorer health typically have lower SES (Keil et al. 1992; Rogers, Hummer and Nam 2000).

Aims

Three aims guide our examination of the associations between sociodemographic factors—including socioeconomic status and race/ethnicity—and physical activity profiles and health outcomes. First, we determine how unique physical activities group into latent activity profiles. Second, we examine the associations between race/ethnicity, education, and physical activity profiles. Third, we examine the association between physical activity profiles and health outcomes including obesity, cardiovascular conditions, and psychological distress.

Data and Methods

Data for this research comes from the 1998 National Health Interview Survey (NHIS), Sample Adult Prevention File, the 1998 Sample Adult File, and the 1998 Imputed Income Files. The NHIS is a nationally, representative cross-sectional household interview survey used to monitor the health of the U. S. population. The sample consists of respondents aged 18 and older who previously served as sample adults for each household yielding 32,440 observations.

The Sample Adult Prevention Module was created to determine Healthy People Objectives for 2010 and contains detailed information on physical activity. Physical activities are asked with the question, “In the past 2 weeks (outlined on calendar), beginning Monday [date], and ending this past Sunday [date], have you done any of the following exercises, sports, or physical active hobbies...”. They ask specifically about activities including: tennis, golf, running, aerobics, stair climbing, swimming, weight lifting, stretching/yoga, cycling, baseball, volleyball, basketball, football, and soccer.

Activities with small frequencies were not included. Respondents with physical limitations were excluded from the sample.

The health outcome variables include obesity, heart conditions, and psychological distress. Obesity is coded dichotomously as body mass index (BMI) ≥ 30 . Cardiovascular conditions are included as a dichotomous measure based on whether a respondent has ever been diagnosed with hypertension, angina, coronary problems, or heart disease. Psychological distress is a count variable ranging from 0 to 24, which includes the degree to which a respondent has felt sad, nervous, restless, hopeless, worthless, or that everything is an effort over the past 30 days.

Other variables of interest include race/ethnicity, education, and income. Race/ethnicity is coded as non-Hispanic White, non-Hispanic Black, and Mexican American. Education is coded categorically as less than a high school degree, high school degree, some college, college degree, and graduate degree. Education can lead to better income which is related to medical care, housing, food, and working conditions (Liberatos et al. 1988). Income is included as categorical measures in \$5,000 increments and top-coded at \$75,000 or more. Because of missing values, we have chosen to use the NHIS multiple imputations for income. This provides us with a better specified measure of family income.

Sociodemographic control variables include, age, age-squared, sex, census region, interview quarter, and activity status. Sex is coded with female as the referent. Engagement in types of physical activities is related to age, with younger individuals more likely to engage in more “popular” team sports that are tacitly linked to youth. Also, physical activity is known to decline through young adulthood (Dovey, Reeder and

Chalmers 1998). Accordingly, age is included as a control and is coded continuously and as a squared-term. Region of residence includes four dichotomous variables for the Northeast, Midwest, South, and West. The interview quarter is used to control for seasonally dependent activities. The NHIS asks about the frequency and level of engagement for each activity, to estimate kilocalorie expenditure that is subsequently used to determine a level of physical activity that is included as sedentary (0.0 to 1.3 kilocalories per kilogram per day), moderately active (1.5 to 2.9 kilocalories per kilogram per day), and very active (3.0 or more kilocalories per kilogram per day). Also, we include a control for respondents that are exercising to lose weight as recommended by a health care professional to address causality and selection.

Statistical analyses were conducted with STATA 9.0. Appropriate weights were included and standard error adjustments were made for the complex sampling frame and the multiple imputations for income included in the NHIS.

Results

Table 1 presents the descriptive percentages for each of the variables. Approximately 52 percent of the sample did not engage in any of the fifteen physically active hobbies in the past two weeks, suggesting a high level of sedentary behavior. Percentages indicate that walking and stretching are the most frequent physical activities, followed by weight lifting, biking, and running. The least frequent activities include volleyball, soccer, and football. Activity status indicates that only 38 percent of the population is at least moderately active.

Figure 1 demonstrates the overlap in activities, by indicating the mean number of activities (other than the named activity) for respondents who have indicated a specific activity. While a larger portion of the sample did not engage in any physical activities, of those that do, approximately 33 percent engaged in more than one physical activity. Walking has the lowest overlap of any of the activities with walkers reporting an average of 1.52 other activities. Individuals who indicate participation in stretching, golf, and cycling average less than three other activities. The highest overlap appears in team sports, particularly among football, volleyball, and soccer players, with football players exhibiting the highest overlap with an average of 4.28 other activities.

Table 2 presents results from a principle components factor analysis with varimax rotation that identifies three factors. The first factor represents activities that individuals can undertake by themselves without the assistance of another individual. Further, each of these activities, with the exception of weight lifting, is often identified as cardiovascular exercise. The second factor is characterized by team sports and activities that need several other individuals to participate. The third factor includes activities associated with club memberships or usage fees. The three factors are hereby referred to as Individual, Team, and Club, respectively. Three standardized scales are constructed from the factor loadings to represent engagement in these specific activity profiles. The standardized scales each have a minimum score of 0 representing little to no engagement in any physical activity with a standard deviation of 1.

Table 3 uses OLS regression to regress each of the activity portfolios on education and income, controlling for relevant sociodemographic and control variables. We use these models to examine the importance of race/ethnicity and education. Model 1

examines the Individual activity profile. Controlling for socioeconomic status, we find significantly higher scores on the Individual-level scale for Non-Hispanic blacks compared to non-Hispanic whites. Education indicates a graded relationship, with higher levels of education indicating approximately a .10 increase in the Individual scale for each increase in educational level. Results in Model 2 for the Team profile indicate significantly positive race/ethnic differences for non-Hispanic blacks. Increasing levels of education have a negative effect on engagement in team activities. The examinations of Club activities in Model 3 present the largest coefficients for race/ethnicity. Non-Hispanic blacks and Hispanics have scores that are .21 and .16 points lower than non-Hispanic whites. Education is also related with engagement in Club activities. There is a large increase in the effect of education on club activities between some college and a college degree, but a marginal, albeit significant increase between graduate degree and college degree. Also of note, income (\$75,000 and higher) is significant above and beyond race/ethnicity and education and as expected, has a positive effect on engagement in Club activities.

Tables 5 through 7 present the regressions of health outcomes on each of the health activity profiles. Each of the models controls for physical activity status. The inclusion of this control is a way to determine whether activity profiles are associated with health, net of the calorie expenditure. Table 5 shows the logistic regression odds ratios for obesity and indicates that among the health profiles, only the Individual profile has a significant association with obesity, with increasing levels of Individual activities linked to decreased risk of obesity. The inclusion of profile types also has a suppressor effect on race/ethnicity, suggesting that race/ethnic differences in obesity may be masked

by engagement in specific activity types. The models in table 6 regress the variable of cardiovascular conditions on the covariates. Again, as shown in model 2, the Individual profile is the only activity profile with a significant relationship to the health outcome; engagement in Team or Club profiles do not appear to be associated with positive cardiovascular outcomes. Finally, Table 6 provides the incident rate ratio results from the negative binomial regressions for psychological distress. Results indicate that both Team and Club sports have a significantly negative relationship with psychological distress.

Discussion

This analysis examines the relationship between race/ethnicity, education, physical activity profiles, and health outcomes. While prior research has demonstrated that education and race/ethnicity are important factors for health behaviors, few studies have focused directly on their relationship to defined activity profiles. This research affirms the importance of race/ethnicity and education on physical activity behaviors and highlights how physical activities follow distinct patterns that are related to class based norms and cultural resources, and are linked to physical and mental health outcomes.

While our results indicate that a large group of individuals in the U.S. do not actively engage in physical activity, we focus on those with some physical activity experience. Of those respondents that do participate, a large proportion participates in individual-type activities such as walking and running. But, those that engage in physical activity are not likely to solely focus on one type of activity, but are likely to participate in numerous activities. Results indicate distinct relationships between physical activities that shape unique health profiles. While each activity profile is associated with different

types of exercise, the activity profiles appear to be defined by the social form of the activity, rather than by physiological systems or energy expenditure.

A focus on the relationships between types of physical activities attends to social processes that may create disparities in health. Demographic characteristics are representative of an individual's location in the social hierarchy and are useful predictors of participation in physical activity. Education and race/ethnicity are two of the most established determinants of health outcomes (Adler et al. 1994; Williams and Collins 1995) and are related to important cultural resources that determine access to power, privilege, and resources. Drawing on theories of symbolic distinction (Bourdieu 1984b; Cockerham et al. 1997a), we suggest that physical activities are socially determined by race/ethnic and educational boundaries.

Results for race/ethnicity are mixed. Race/ethnicity appears to have the largest effect for participation in Club activities, controlling for important factors such as income and education. While explicit racial barriers are unlikely to exist in Club activities, norms, resources, and expectations are likely to shape preferences that minimize participation for both non-Hispanic blacks and Mexican Americans. Also, Individual profiles show a higher rate of participation for non-Hispanic blacks when controls for education are included. While this appears to run counter to Bourdieu's (1984b) suggestion that individual sports should be more populated by high status groups, this relationship only exists when education is controlled. This suggests potential health gains that could be made with education gains for non-Hispanic blacks. Additionally, results indicate potential health gains for non-Hispanic blacks engaging in Individual type

behaviors and mental health gains for non-Hispanic blacks and Mexican Americans engaged in more Club type activities.

Education has an important relationship with each of the physical activity patterns. In particular, we find that different levels of education have significant effects on each of the physical activity profiles, reinforcing the importance of knowledge and social status. For instance, while each increase in educational level has a similar linear association with participation in both Individual and Team activities, the same is not true for Club activities. The relationship between education and Club activities does not follow an incrementally linear increase, but rather, highlights the relevance of a college degree versus some college education. A degree may confer a form of distinction above and beyond simple knowledge. Accordingly, tastes, preferences, and social networks are likely to be established throughout a college education. Rather than merely serving as a means to physical fitness, the Club activities may represent forms of cultural or social capital. It is possible that the social distinction inferred through a college degree is bolstered with engagement in Club activities.

Importantly, we find that different types of health profiles are associated with unique health outcomes, net of kilocaloric expenditure. We find that Individual profiles are linked to outcomes such as obesity and cardiovascular conditions and are not associated with better mental health. Alternatively, behaviors that are less likely to take place in isolation characterized by the Team and Club profiles, are not associated with heart conditions or obesity, but have a salubrious relationship with mental health. The fact that the results remain robust with controls for activity levels suggest that physical activity profiles may reflect larger social processes; participation in activity types may be

a reflection of larger lifestyle patterns. For instance, whereas the Individual activities may be explicitly health-oriented, the group-related activities may be linked to social networks that represent forms of social capital with potential long-term mental health-benefits (Cattell 2001; Putnam 2000).

Physical activity is a complex behavior that has many interrelated dimensions. Evidence suggests that only 30 percent of U.S. adults engage in enough regular physical activity to achieve health-related benefits (NCHS 2005). The adoption of regular physical activity is an important component of health and engagement in leisure-time physical health, be it regular or intermittent, is likely to produce health benefits, with specific types of activity linked to particular outcomes. Activities that promote an overall contour of physical fitness have important relationships with health and are associated with continued physical functioning over the life course (Brown, Sinacore and Host 1995; LaCroix et al. 1993; Nelson et al. 1994; U.S. Department of Health and Human Services 1996). By focusing on distinct health patterns, we have shown that physical activity is inextricably linked to social status. Physical activity may be interpreted as a form of social distinction with reverberating health consequences. Positive health is not simply linked to calorie expenditure and in order to further explore health disparities, research needs to consider the potential benefits of engagement in unique physical activity profiles.

Table 1. Variable Frequency Distributions (Survey Adjusted) (N=32, 440)

<u>Race/Ethnicity</u>	
Non-Hispanic white	84.84
Non-Hispanic black	12.61
Mexican-American	2.55
<u>Education</u>	
Less than High School	15.97
High School Degree	31.64
Some College (AA)	29.05
College Degree	15.41
Graduate School	7.93
<u>Total Family Income</u>	
\$0-\$5,000	3.12
\$5,000-\$9,999	5.63
\$10,000-\$14,999	6.54
\$15,000-\$19,999	6.36
\$20,000-\$24,999	7.36
\$25,000-\$34,999	13.39
\$35,000-\$44,999	11.51
\$45,000-\$54,999	10.76
\$55,000-\$64,999	8.07
\$65,000-\$74,999	6.47
\$75,000+	20.78
<u>Employment Status</u>	
Unemployed	27.25
Employed	72.74
<u>Sex</u>	
Female	51.99
Male	48.01
<u>Mean Age</u>	
	45.38
<u>Region</u>	
Northeast	19.83
Midwest	27.55
South	36.41
West	16.21
<u>Physical Activities</u>	
No Activities	52.22
<u>Type of Activities</u>	
Walk	47.60
Run	11.91
Aerobic	7.24
Stretch	31.20
Weight Lifting	17.90
Bike	14.30
Stair Climbing	7.65
Baseball	3.41
Basketball	6.89
Volleyball	1.91
Soccer	1.20
Football	1.69
Swim	6.45
Tennis	1.86
Golf	6.09
<u>Physical Activity Status</u>	
Sedentary (0.0-1.3 kcal/kg/day)	61.90
Moderately Active (1.5-2.9 kcal/kg/day)	15.30
Very Active (3.0+ kcal/kg/day)	22.80

NHIS, 1998

Table 2. Coefficients from Varimax Rotated Principal Components Factor Analysis

Physical Activity	Individual	Team	Club
Walk	0.478	-0.154	0.217
Run	0.544	0.320	0.066
Aerobics	0.577	-0.038	-0.155
Stretch	0.718	0.066	0.127
Weight Lifting	0.671	0.219	0.003
Cycling	0.490	0.038	0.226
Stair Climbing	0.571	-0.004	-0.023
Baseball	0.054	0.506	0.247
Basketball	0.145	0.676	0.063
Volleyball	0.070	0.461	0.155
Soccer	0.059	0.477	0.007
Football	0.043	0.628	-0.046
Swimming	0.214	0.072	0.440
Tennis	0.069	0.063	0.579
Golf	0.008	0.060	0.684

Coefficients > 0.40 in bold

Figure 2. Mean Number of Physical Activities by Activity Type, U.S. Adults 1998

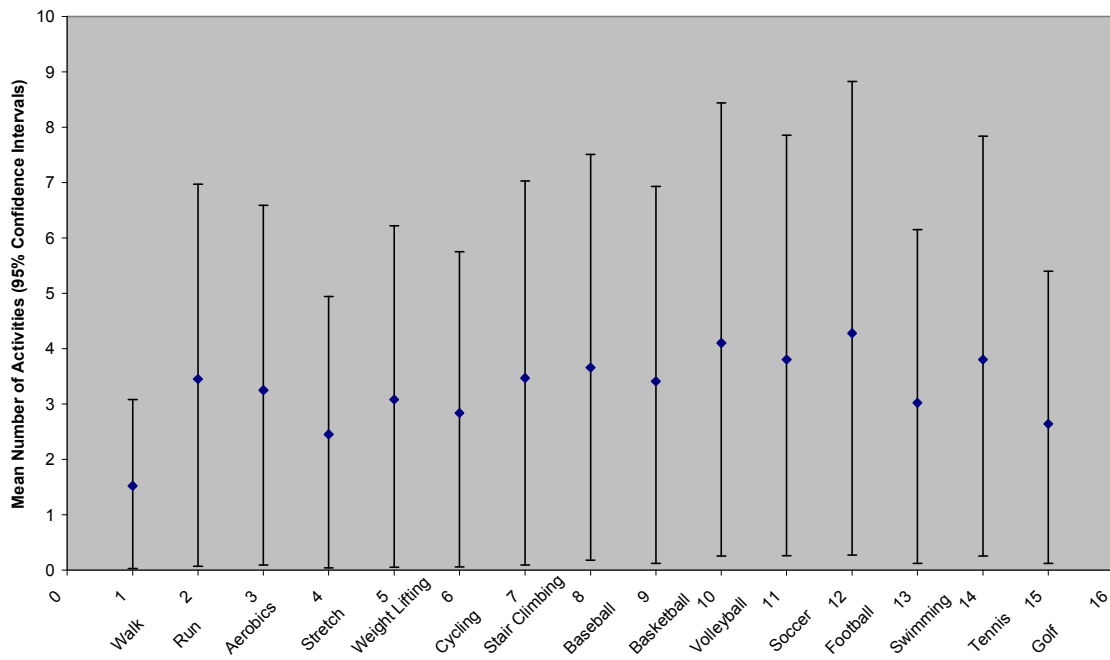


Table 3. Activity Profiles Regressed on Covariates, U.S. Adults 1998

	Individual	Team	Club
<u>Race/Ethnicity</u>			
Non-Hispanic white	ref	ref	ref
Non-Hispanic black	0.08*** (0.02)	0.16*** (0.03)	-0.21*** (0.02)
Mexican-American	0.04 (0.04)	0.06 (0.05)	-0.16*** (0.03)
<u>Education</u>			
Less than High School	-0.03 (0.02)	0.02 (0.03)	-0.08*** (0.02)
High School Degree	ref	ref	ref
Some College (AA)	0.13*** (0.02)	-0.03 (0.02)	0.05** (0.02)
College Degree	0.22*** (0.02)	-0.11*** (0.03)	0.16*** (0.03)
Graduate School	0.33*** (0.03)	-0.17*** (0.03)	0.16*** (0.04)
<u>Total Family Income</u>			
\$0-\$5,000	ref	ref	ref
\$5,000-\$9,999	-0.05 (0.04)	0.03 (0.06)	-0.05 (0.04)
\$10,000-\$14,999	-0.05 (0.04)	0.08 (0.06)	-0.06 (0.04)
\$15,000-\$19,999	-0.03 (0.04)	-0.03 (0.06)	-0.09* (0.04)
\$20,000-\$24,999	-0.06 (0.04)	0.05 (0.06)	-0.02 (0.05)
\$25,000-\$34,999	-0.03 (0.04)	-0.01 (0.05)	-0.01 (0.04)
\$35,000-\$44,999	-0.05 (0.04)	0.07 (0.06)	0.03 (0.05)
\$45,000-\$54,999	-0.04 (0.04)	0.04 (0.06)	0.01 (0.05)
\$55,000-\$64,999	0.01 (0.04)	0.04 (0.06)	0.01 (0.05)
\$65,000-\$74,999	-0.05 (0.05)	0.04 (0.06)	0.07 (0.06)
\$75,000+	-0.01 (0.04)	0.05 (0.06)	0.13** (0.05)
<u>Employment Status</u>			
Unemployed	ref	ref	ref
Employed	0.10*** (0.02)	0.03 (0.02)	0.01 (0.02)
<u>Sex</u>			
Female	ref	ref	ref
Male	-0.19*** (0.01)	0.34*** (0.02)	0.23*** (0.02)
<u>Mean Age</u>			
Age	-0.02*** (0.00)	-0.04*** (0.00)	0.00 (0.00)
Age Squared	0.00*** (0.00)	0.00*** (0.00)	-0.00 (0.00)
<u>Region</u>			
Northeast	ref	ref	ref
Midwest	-0.03 (0.02)	0.01 (0.03)	0.05* (0.02)
South	-0.08*** (0.02)	-0.01 (0.02)	0.10*** (0.02)
West	0.07** (0.02)	-0.01 (0.03)	0.06* (0.03)
<u>Interview Quarter</u>			
	-0.04*** (0.01)	0.01 (0.01)	0.02*** (0.01)
<u>Physical Activity Status</u>			
Sedentary (0.0-1.3 kcal/kg/day)			
Moderately Active (1.5-2.9 kcal/kg/day)	0.61*** (0.02)	0.14*** (0.02)	0.24*** (0.02)
Very Active (3.0+ kcal/kg/day)	1.13*** (0.02)	0.50*** (0.03)	0.52*** (0.03)
Exercising to Lose Weight	0.13*** (0.02)	-0.05** (0.02)	0.02 (0.02)
Constant	0.19** (0.06)	0.81*** (0.09)	-0.38*** (0.08)
Observations	26844	26844	26844
R-squared	0.31	0.13	0.09

Standard errors in parentheses
 *** p<0.001, ** p<0.01, * p<0.05

Table 5. Logistic Regression of Obesity, U.S. Adults 1998

	Model 1	Model 2	Model 3	Model 4
Activity Profile				
Individual		0.75*** (0.02)	-	-
Team		-	1.03 (0.02)	-
Club		-	-	1.00 (0.02)
Race/Ethnicity				
Non-Hispanic white	ref	ref	ref	ref
Non-Hispanic black	1.60*** (0.08)	1.68*** (0.09)	1.63*** (0.09)	1.64*** (0.09)
Mexican-American	1.58*** (0.14)	1.64*** (0.16)	1.61*** (0.16)	1.62*** (0.16)
Education				
Less than High School	1.15* (0.07)	1.12 (0.08)	1.13 (0.08)	1.13 (0.08)
High School Degree	ref	ref	ref	ref
Some College (AA)	0.90* (0.04)	0.94 (0.05)	0.92 (0.04)	0.92 (0.04)
College Degree	0.68*** (0.04)	0.70*** (0.05)	0.67*** (0.05)	0.67*** (0.04)
Graduate School	0.65*** (0.05)	0.71*** (0.06)	0.66*** (0.06)	0.66*** (0.06)
Total Family Income				
\$0-\$5,000	ref	ref	ref	ref
\$5,000-\$9,999	1.14 (0.14)	1.09 (0.15)	1.09 (0.15)	1.10 (0.15)
\$10,000-\$14,999	1.04 (0.12)	0.93 (0.13)	0.94 (0.13)	0.94 (0.13)
\$15,000-\$19,999	0.93 (0.11)	0.97 (0.13)	0.98 (0.13)	0.98 (0.13)
\$20,000-\$24,999	0.96 (0.12)	0.99 (0.14)	1.00 (0.14)	1.01 (0.14)
\$25,000-\$34,999	0.93 (0.10)	0.95 (0.12)	0.95 (0.12)	0.95 (0.12)
\$35,000-\$44,999	0.86 (0.10)	0.86 (0.12)	0.87 (0.12)	0.87 (0.12)
\$45,000-\$54,999	0.93 (0.11)	0.90 (0.12)	0.91 (0.12)	0.91 (0.12)
\$55,000-\$64,999	0.81 (0.10)	0.83 (0.12)	0.83 (0.12)	0.83 (0.12)
\$65,000-\$74,999	0.86 (0.11)	0.85 (0.12)	0.86 (0.12)	0.86 (0.12)
\$75,000+	0.73* (0.09)	0.73* (0.10)	0.73* (0.10)	0.73* (0.10)
Employment Status				
Unemployed	ref	ref	ref	ref
Employed	0.91 (0.05)	0.95 (0.06)	0.93 (0.06)	0.93 (0.06)
Sex				
Female	ref	ref	ref	ref
Male	1.20*** (0.05)	1.21*** (0.05)	1.25*** (0.05)	1.26*** (0.05)
Mean Age				
Age	1.08*** (0.01)	1.08*** (0.01)	1.09*** (0.01)	1.09*** (0.01)
Age Squared				
	1.00*** (0.00)	1.00*** (0.00)	1.00*** (0.00)	1.00*** (0.00)
Region				
Northeast	ref	ref	ref	ref
Midwest	1.09 (0.06)	1.06 (0.06)	1.06 (0.06)	1.06 (0.06)
South	1.01 (0.06)	0.96 (0.06)	0.98 (0.06)	0.98 (0.06)
West	0.89 (0.06)	0.88 (0.06)	0.87* (0.06)	0.86* (0.06)
Interview Quarter				
	1.07*** (0.02)	1.07*** (0.02)	1.08*** (0.02)	1.08*** (0.02)
Physical Activity Status				
Sedentary (0.0-1.3 kcal/kg/day)	ref	ref	ref	ref
Moderately Active (1.5-2.9 kcal/kg/day)	0.64*** (0.04)	0.77*** (0.05)	0.65*** (0.04)	0.66*** (0.04)
Very Active (3.0+ kcal/kg/day)	0.56*** (0.03)	0.78*** (0.05)	0.58*** (0.03)	0.59*** (0.03)
Exercising to Lose Weight				
	3.86*** (0.15)	3.82*** (0.16)	3.65*** (0.16)	3.65*** (0.16)
Constant	0.03*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.03*** (0.01)
Observations	26844	26844	26844	26844

Standard errors in parentheses
 *** p<0.001, ** p<0.01, * p<0.05

Table 6. Logistic Regression of Heart Conditions, U.S. Adults 1998

	Model 1	Model 2	Model 3	Model 4
Activity Profile				
Individual	-	0.91*** (0.02)	-	-
Team	-	-	0.99 (0.02)	-
Club	-	-	-	0.96 (0.02)
Race/Ethnicity				
Non-Hispanic white	ref	ref	ref	ref
Non-Hispanic black	1.63*** (0.08)	1.70*** (0.09)	1.69*** (0.09)	1.67*** (0.09)
Mexican-American	0.79* (0.09)	0.84 (0.11)	0.84 (0.11)	0.83 (0.11)
Education				
Less than High School	1.09 (0.06)	1.01 (0.07)	1.01 (0.07)	1.01 (0.07)
High School Degree	ref	ref	ref	ref
Some College (AA)	0.90* (0.04)	0.91 (0.05)	0.90 (0.05)	0.91 (0.05)
College Degree	0.79*** (0.05)	0.80*** (0.05)	0.79*** (0.05)	0.79*** (0.05)
Graduate School	0.74*** (0.06)	0.76*** (0.06)	0.74*** (0.06)	0.74*** (0.06)
Total Family Income				
\$0-\$5,000	ref	ref	ref	ref
\$5,000-\$9,999	1.18 (0.14)	1.05 (0.14)	1.05 (0.14)	1.05 (0.14)
\$10,000-\$14,999	1.09 (0.13)	0.96 (0.13)	0.97 (0.13)	0.96 (0.13)
\$15,000-\$19,999	1.01 (0.12)	0.98 (0.13)	0.98 (0.13)	0.98 (0.13)
\$20,000-\$24,999	1.01 (0.14)	0.98 (0.15)	0.98 (0.15)	0.98 (0.15)
\$25,000-\$34,999	0.95 (0.11)	0.95 (0.12)	0.95 (0.12)	0.95 (0.12)
\$35,000-\$44,999	0.97 (0.11)	0.96 (0.12)	0.96 (0.12)	0.96 (0.12)
\$45,000-\$54,999	0.97 (0.11)	0.95 (0.13)	0.95 (0.13)	0.95 (0.13)
\$55,000-\$64,999	0.84 (0.11)	0.87 (0.12)	0.86 (0.12)	0.86 (0.12)
\$65,000-\$74,999	0.83 (0.11)	0.80 (0.12)	0.81 (0.12)	0.81 (0.12)
\$75,000+	0.80 (0.09)	0.80 (0.10)	0.80 (0.10)	0.80 (0.10)
Employment Status				
Unemployed	ref	ref	ref	ref
Employed	0.66*** (0.03)	0.83** (0.05)	0.82** (0.05)	0.82** (0.05)
Sex				
Female	ref	ref	ref	ref
Male	1.34*** (0.05)	1.30*** (0.05)	1.32*** (0.05)	1.33*** (0.05)
Mean Age				
Age	1.11*** (0.01)	1.09*** (0.01)	1.09*** (0.01)	1.09*** (0.01)
Age Squared				
	1.00*** (0.00)	1.00*** (0.00)	1.00*** (0.00)	1.00*** (0.00)
Region				
Northeast	ref	ref	ref	ref
Midwest	1.08 (0.06)	1.07 (0.06)	1.08 (0.06)	1.08 (0.06)
South	1.22*** (0.07)	1.16* (0.07)	1.17* (0.07)	1.17** (0.07)
West	0.99 (0.06)	0.95 (0.06)	0.95 (0.06)	0.95 (0.06)
Interview Quarter				
	1.00 (0.02)	1.01 (0.02)	1.01 (0.02)	1.01 (0.02)
Physical Activity Status				
Sedentary (0.0-1.3 kcal/kg/day)	ref	ref	ref	ref
Moderately Active (1.5-2.9 kcal/kg/day)	0.90* (0.05)	1.04 (0.06)	0.99 (0.05)	1.00 (0.05)
Very Active (3.0+ kcal/kg/day)	0.81*** (0.04)	0.99 (0.06)	0.91 (0.05)	0.92 (0.05)
Exercising to Lose Weight				
	1.83*** (0.07)	1.89*** (0.08)	1.87*** (0.08)	1.87*** (0.08)
Constant	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Observations	26844	26844	26844	26844

Standard errors in parentheses
 *** p<0.001, ** p<0.01, * p<0.05

Table 6. Negative Binomial Regression of Psychological Distress, U.S. Adults 1998

	Model 1	Model 2	Model 3	Model 4
Activity Profile				
Individual	-	1.01*** (0.00)	-	-
Team	-	-	0.98*** (0.00)	-
Club	-	-	-	0.95*** (0.00)
Race/Ethnicity				
Non-Hispanic white	ref	ref	ref	ref
Non-Hispanic black	0.96** (0.01)	0.96*** (0.00)	0.96*** (0.00)	0.95*** (0.00)
Mexican-American	0.97 (0.02)	0.93*** (0.00)	0.93*** (0.00)	0.93*** (0.00)
Education				
Less than High School	1.08*** (0.01)	1.05*** (0.00)	1.05*** (0.00)	1.05*** (0.00)
High School Degree	ref	ref	ref	ref
Some College (AA)	0.98 (0.01)	0.94*** (0.00)	0.94*** (0.00)	0.94*** (0.00)
College Degree	0.88*** (0.02)	0.84*** (0.00)	0.84*** (0.00)	0.85*** (0.00)
Graduate School	1.01 (0.02)	0.96*** (0.00)	0.96*** (0.00)	0.97*** (0.00)
Total Family Income				
\$0-\$5,000	ref	ref	ref	ref
\$5,000-\$9,999	1.01 (0.02)	1.09* (0.05)	1.10* (0.05)	1.09* (0.05)
\$10,000-\$14,999	0.99 (0.02)	1.09** (0.03)	1.09** (0.03)	1.09** (0.03)
\$15,000-\$19,999	0.89*** (0.02)	0.95 (0.04)	0.95 (0.04)	0.95 (0.04)
\$20,000-\$24,999	0.85*** (0.02)	0.98 (0.05)	0.98 (0.05)	0.97 (0.05)
\$25,000-\$34,999	0.86*** (0.02)	0.96*** (0.01)	0.96*** (0.01)	0.96*** (0.01)
\$35,000-\$44,999	0.80*** (0.02)	0.88*** (0.02)	0.89*** (0.02)	0.88*** (0.02)
\$45,000-\$54,999	0.74*** (0.02)	0.82*** (0.03)	0.82*** (0.03)	0.82*** (0.03)
\$55,000-\$64,999	0.77*** (0.02)	0.88*** (0.02)	0.89*** (0.02)	0.88*** (0.02)
\$65,000-\$74,999	0.84*** (0.03)	0.97 (0.04)	0.97 (0.04)	0.97 (0.04)
\$75,000+	0.71*** (0.02)	0.81*** (0.03)	0.81*** (0.03)	0.81*** (0.03)
Employment Status				
Unemployed	ref	ref	ref	ref
Employed	0.76*** (0.01)	0.79*** (0.01)	0.79*** (0.01)	0.80*** (0.01)
Sex				
Female	ref	ref	ref	ref
Male	0.97** (0.01)	0.97*** (0.00)	0.98*** (0.00)	0.98*** (0.00)
Mean Age				
Age	1.02*** (0.00)	1.01*** (0.00)	1.01*** (0.00)	1.01*** (0.00)
Age Squared				
	1.00*** (0.00)	1.00*** (0.00)	1.00*** (0.00)	1.00*** (0.00)
Region				
Northeast	ref	ref	ref	ref
Midwest	1.03* (0.02)	0.98*** (0.00)	0.98*** (0.00)	0.98*** (0.00)
South	0.97 (0.01)	0.93*** (0.00)	0.93*** (0.00)	0.94*** (0.00)
West	1.06*** (0.02)	1.04*** (0.00)	1.04*** (0.00)	1.04*** (0.00)
Interview Quarter				
	0.98*** (0.00)	0.97*** (0.00)	0.97*** (0.00)	0.97*** (0.00)
Physical Activity Status				
Sedentary (0.0-1.3 kcal/kg/day)	ref	ref	ref	ref
Moderately Active (1.5-2.9 kcal/kg/day)	0.82*** (0.01)	0.85*** (0.00)	0.85*** (0.00)	0.86*** (0.00)
Very Active (3.0+ kcal/kg/day)	0.84*** (0.01)	0.88*** (0.00)	0.89*** (0.00)	0.90*** (0.00)
Exercising to Lose Weight				
Constant	1.03** (0.01)	1.08*** (0.00)	1.08*** (0.00)	1.08*** (0.00)
	1.35*** (0.06)	1.38*** (0.05)	1.40*** (0.05)	1.36*** (0.05)
Observations	26844	26844	26844	26844

Standard errors in parentheses
 *** p<0.001, ** p<0.01, * p<0.05

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