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The Role of Pain in Understanding Racial/Ethnic Differences in the Frequency of Physical Activity Among Older Adults

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Abstract

Objectives: To evaluate racial/ethnic differences in physical activity among White, Black, and Hispanic adults aged 65 years and older, and to assess the potential role of pain as a mediator.

Methods: Analyses were based on data from the 2008 Health and Retirement Study. Logistic regression was used to evaluate associations between race/ethnicity and pain and the odds of regular physical activity.

Results: Compared to Whites, the odds of both light physical activity and moderate/vigorous physical activity were lower among Blacks, but not Hispanics. A graded inverse association between levels of pain severity and the odds of physical activity was found, but pain did not mediate racial/ethnic differences in physical activity.

Discussion: When compared to Whites, older Blacks appear to have relatively low rates of physical activity even without comparatively high levels of pain, while older Hispanics experience relatively high rates of pain, but are perhaps more resilient to the effects of pain on physical activity.

Keywords

physical activity; pain; race/ethnicity

Physical activity is a complex behavior that can help maintain and improve individuals' health, decrease disability, and delay the onset of functional limitations (Ashe, Miller, Eng, & Noreau, 2009; Feinglass et al., 2005; Gerst, Michaels-Obregon, & Wong, 2011; National Center for Health Statistics [NCHS], 2005, 2007). The Center for Disease Control and Prevention and the American College of Sports Medicine recommend that older adults with no limiting physical health condition(s) engage in at least 150 min of moderate physical activity and/or muscle strengthening activities per week (NCHS, 2007). However, the majority of persons in the United States do not engage in regular physical activity that is

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consistent with this recommendation. In 2001, 54.6% of the population was not active enough to meet these recommendations (NCHS, 2007).

Data clearly show the impact and significance of physical activity among older adults. Yet, little is known of the direct benefits of physical activity among older adults from diverse race and ethnic populations. Despite increasing rates of physical activity within the elderly population, racial/ethnic disparities in physical activity continue to exist (NCHS, 2007). According to U.S. surveillance data there is substantial variation in the rates of physical activity participation by gender and race/ethnicity. Recent data show that among men, Whites have the highest prevalence of regular physical activity (52.3%), followed by men classified as “other” race (45.7%), Blacks (45.3%), and Hispanics (41.9%). Similarly, among women, Whites have the highest prevalence of regular physical activity (49.6%), followed by women classified as “other” race (46.6%), Hispanics (40.5%), and Blacks (36.1%) (NCHS, 2008).

Functional limitations that impair the ability to live independently (such as walking and climbing a flight of stairs) are often reported to increase with advanced age. This may begin to explain the race and ethnic group differences in physical activity (Covinsky, Lindquist, Dunlop, & Yelin, 2009; Feinglass et al., 2005; Portenoy, Ugarte, Fuller, & Haas, 2004; Seefeldt, Malina, & Clark, 2002). Current data show that Blacks and Hispanics are more likely to report functional limitations and disability than Whites. Furthermore, research shows an increased prevalence of functional decline among those diagnosed with a painful chronic medical condition(s) (e.g., arthritis, diabetes, obesity, fractures) (Hung, Ross, Boockvar, & Siu, 2011; Ramsey et al., 2008; Tucker, Falcon, Bianchi, Cacho, & Bermudez, 2000). Other studies corroborate these findings showing that elderly minorities are disproportionately affected by these painful and debilitating illnesses, thus reducing their ability to remain physically active (Al Snih, Markides, Ray, & Goodwin, 2001; Baker, 2003; Green et al., 2003; Helme & Gibson, 2001; Reyes-Gibby, Aday, Todd, Cleeland, & Anderson, 2007).

In addition to actual functional limitations, variation in experiences of pain may also explain racial/ethnic differences in physical activity among older adults. Pain is a subjective and multifaceted phenomena that is often based on an individual's perceptions, learned values, attitudes, and past experiences (Baker, 2003; Elliott, Smith, Penny, Smith, & Chambers, 1999; Ferrell, 1995; Latham & Davis, 1994; Skevington, 1998). The prevalence of pain is difficult to determine; however, estimates are as high as 40% among the general population, and range from 45% to 80% among older adults (Clark, 2002; Helme & Gibson, 2001). Pain is recognized as a significant risk factor for reported functional limitations (Baker, 2005; Crespo, Keteyian, Heath, & Sempos, 1996; Hung et al., 2011), and may have a negative effect on an individual's physical and psychological health, daily activities, employment, and overall quality of life (Green, Todd, Lebovits, & Francis, 2006; Green et al., 2003). While the Institute of Medicine (IOM) recognizes pain as a disease and not just a symptom of other conditions, it is also described as a common health concern that impacts an individual's physical functioning, psychological health, and social well-being (Baker, 2003; Elliott et al., 1999; Ferrell, 1995; Latham & Davis, 1994; Siegel, Weinstein, Russell, & Gold, 1996; Skevington, 1998).

It is similarly documented that pain contributes to lost work productivity and increased health-care expenditures. This is of growing concern considering the impact it has on the abilities of elderly minorities to function physically, psychologically, and socially in their environment (Helme & Gibson, 1999). Data show that pain prevalence is higher among Blacks and Hispanics compared to Whites (Anderson, Green, & Payne, 2009; Green et al., 2003, 2006; Hardt, Jacobsen, Goldberg, Nickel, & Buchwald, 2008; Portenoy et al., 2004).

In addition, severe pain in Blacks and Hispanics is often associated with socioeconomic status, which may contribute to poorer health outcomes (Baker, 2005; Green et al., 2003; Hardt et al., 2008; Portenoy et al., 2004; Weaver et al., 2009).

Significant associations between pain and physical activity have been found among the general population; however, less is known about this association among older adults from diverse race and ethnic groups. In examining the influence of pain on physical activity, this study aimed to (a) determine racial/ethnic group differences in the prevalence of regular participation in light and moderate/vigorous physical activity; (b) quantify the influence of self-reported pain on physical activity, as well as its role in mediating racial/ethnic differences in physical activity, after adjusting for physical functioning and demographic indicators; and (c) assess the strength of the association between pain and physical activity within older White, Black, and Hispanic community-dwelling adults.

Data and Method

Data and Study Population

Data for this study were taken from the Health and Retirement Study (HRS), a nationally representative panel survey of community-dwelling adults. The initial sample, drawn in 1992 from a multistage, clustered area probability design of households, targeted individuals born between 1931 and 1941. Follow-up interviews and new cohort additions have occurred at regular intervals and have resulted in a nationally representative sample of American adults above the age of 50. Detailed descriptions of sampling procedures and study design are available online at <http://hrsonline.isr.umich.edu>.

Our sample was restricted to Whites, Blacks, and Hispanics, aged 65 years and older, who were interviewed in the 2008 survey. Non-Hispanics of other races (i.e. Asian, American Indians) consisted of less than 2.5% of all respondents and were omitted from the analyses. The analytic sample included 11,132 individuals. Less than 1% of cases were excluded due to list-wise deletion of missing values.

Measures

Two binary outcome measures (regular moderate/vigorous physical activity, and regular light physical activity) were constructed based on a series of questions about physical activity/exercise participation. Respondents were asked how often they participated in vigorous exercise, moderate exercise, and mild activity. Vigorous exercise consisted of “sports or activities that are vigorous, such as running or jogging, swimming, cycling, aerobics or gym workout, tennis, or digging with a spade or shovel.” Moderate activity included “sports or activities that are moderately energetic such as gardening, cleaning the car, walking at a moderate pace, dancing, floor, or stretching exercises.” Mild activity was described as “sports or activities that are mildly energetic such as vacuuming, laundry, and home repairs.” Five possible responses were available: “every day,” “more than once a week,” “once a week,” “one to two times a month,” or “hardly ever or never.” While others (He & Baker, 2005; Tucker-Seeley, Subramanian, Li, & Sorensen, 2009) have combined these measures of different levels of physical activity into one index, we evaluated light and moderate/vigorous separately in order to assess potential differences in the role of pain has on light physical activity versus moderate/vigorous physical activity. Accordingly, respondents who reported participating in mild activity two times a week or more were characterized as regular participants in light activity (0 = once a week or less often; 1 = more than once a week). The moderate/vigorous activity outcome was also constructed by defining respondents who reported exercising moderately or vigorously more than once a week as regular participants in moderate/vigorous activity (0 = once a week or less; 1 = more than once a week).

The pain measures were based on two questions: (a) “Are you often troubled with pain?” and (b) “How bad is the pain most of the time: mild, moderate, or severe?” Four dummy variables were then created to represent the level of pain. If respondents answered the first question with “No” they were classified as having “No pain.” Respondents who answered “Yes” to the initial question were classified as having “Mild pain,” “Moderate pain,” or “Severe pain” based on their response to the second question.

Covariates

Two sociodemographic variables—gender (0 = *female*; 1 = *male*) and age (measured continuously in years)—were included in the models as controls. Education (measured in years) was used as an indicator of socioeconomic status. An index of comorbid health conditions was included in the analyses. This index ranged from 0 to 8 to reflect the number of diagnosed health conditions that the respondent self-reports. Conditions include high blood pressure, cancer (excluding skin), diabetes, stroke, heart disease, lung problems, arthritis, and psychological problems (emotional, nervous, or psychiatric problems). In addition, the effects of functional ability on activity were controlled for with a measure of functional limitations that ranged from 0 to 5 (i.e., the total number of affirmative responses to having some difficulty with activities of daily living—bathing, dressing, eating, walking across a room, and getting in or out of bed).

Data Analysis

The analyses began with a series of bivariate assessments of the extent to which the prevalence of light and moderate/vigorous physical activity, as well as levels of pain and physical functioning, differed across racial/ethnic groups. The gender and age distributions in each of the three racial/ethnic groups were also examined at this stage of the analysis. Next, logistic regression was used to evaluate racial/ethnic differences in the odds of light and moderate/vigorous activity participation, while adjusting for gender, age, education, health conditions, and physical functioning. Following this, the measure of pain was entered into the models in order to assess its association with physical activity, as well as its role in mediating racial/ethnic differences in physical activity. Finally, an additional set of logistic regression models were estimated in order to assess the association between pain and physical activity within each of the three racial/ethnic groups. All regression models were weighted using the HRS population weights according to survey design guidelines (<http://hrsonline.isr.umich.edu>).

Results

Table 1 presents the weighted unadjusted racial/ethnic differences in rates of physical activity, levels of pain, and physical functioning. On the basis of these bivariate analyses, it appears as if the racial/ethnic distributions of physical activity, pain, and physical functioning are not uniform. Participation in both light physical activity and moderate/vigorous physical activity are most prevalent among Whites (56.2% and 55.8%), and least prevalent among Blacks (40.6% and 41.2%). The rate of moderate/vigorous physical activity among Hispanics is lower than that among Whites, but higher than the rate for Blacks.

Racial/ethnic differences in pain follow a different pattern. Pain-free prevalence rates are highest among Blacks (69.7%), and lowest among Hispanics (63.1%). Relatively low rates of moderate pain are observed among Blacks (14.3%), while relatively low rates of severe pain are observed among Whites (5.3%). Levels of difficulty with physical functioning are also relatively low among Whites (0.3) compared to the other racial/ethnic groups.

Table 2 presents the results from the logistic regression models. Model 1 shows that after adjusting for group differences in age, gender, education, health conditions, and physical functioning, Whites were more likely to engage in regular light physical activity compared to Black older adults, but not older Hispanics. In particular, this model shows that compared to Whites, the odds of engaging in frequent light physical activity were about 45% lower among Blacks (odds ratio [OR] = 0.55; 95% confidence interval [CI; 0.48, 0.64]), but not significantly lower among Hispanics (OR = 0.90; 95% CI [0.75, 1.08]). Similarly, Model 3 indicates that the odds of engaging in frequent moderate/vigorous physical activity were about 32% lower among Blacks (OR = 0.68; 95% CI [0.58, 0.79]) compared to Whites, and that the likelihood of engaging in this level of physical activity were roughly equivalent between Hispanics and Whites (OR = 1.15; 95% CI [0.95, 1.38]).

In Model 2 (Table 2), the association between pain and light physical activity is considered. These results indicate a graded inverse association between levels of pain severity and the odds of regular light physical activity. Neither mild nor moderate pain was significantly associated with light physical activity, while physical activity and severe pain was associated with a 29% decrease in the odds of light physical activity (OR = 0.71; 95% CI [0.59, 0.86]). Furthermore, accounting for levels of pain does not substantially alter the association between race/ethnicity and light physical activity.

Similarly, as indicated in Model 4, a graded inverse association between pain severity and moderate/vigorous physical activity was found, with no significant reduction in the odds of moderate/vigorous physical activity among those with mild pain, a 21% reduction among those with moderate pain (OR = 0.79; 95% CI [0.71, 0.88]), and a 26% reduction among those with severe pain (OR = 0.74; 95% CI [0.61, 0.90]). The results from Model 4 also suggest that pain does not mediate racial/ethnic differences in physical activity, as accounting for pain in the model does not appear to alter the estimated associations between race/ethnicity and physical activity.

Table 3 shows the results from models that were estimated after stratifying the sample by race/ethnicity. Similar to the results presented in Table 2, the results with respect to light physical activity for Whites show that levels of pain were associated with the odds of physical activity in a graded and inverse fashion, ranging from a 7% (non-significant) reduction among those with mild pain (OR = 0.93; 95% CI [0.79, 1.10]) to a 31% reduction among those with severe pain (OR = 0.69; 95% CI: 0.56, 0.86). In contrast, no clear inverse association between any level of pain and light physical activity was evident among Blacks and Hispanics. Though the estimated reduction in the odds of light physical activity among Blacks and Hispanics with severe pain was 18% and 13%, respectively, the variability of these estimates were substantial enough to render them nonsignificant. Among Hispanics with mild pain, the odds of participating in regular light physical activity were increased by more than twofold relative to those with no pain (OR = 2.48; 95% CI [1.46, 4.22]).

In addition, among Whites, pain was associated with the odds of moderate/vigorous physical activity in a graded inverse fashion, ranging from a 12% (nonsignificant) reduction for those with mild pain (OR = 0.88; 95% CI [0.75, 1.03]) to a 21% to 22% reduction among those with either severe or moderate pain (OR = 0.79; 95% CI [0.63, 0.98]; and OR = 0.78; 95% CI [0.69, 0.88], respectively). In contrast, among Blacks and Hispanics, no level of pain was significantly associated with the odds of moderate/vigorous physical activity. Again, although the estimated reduction in the odds of moderate/vigorous physical activity among Blacks and Hispanics with severe pain was substantial (38% in both cases), these estimates were not precise enough to reach statistical significance.

Discussion

This study aimed to examine the relationship between physical activity, race/ethnicity, and pain in a sample of Black, White, and Hispanic adults 65 years of age and older. While prior research has evaluated racial and ethnic differences in physical activity and pain as independent areas of research, no studies have focused specifically on the relationship between pain and physical activity in a racial and ethnically diverse population. This study affirms the importance of evaluating the influence of pain on physical activity, while also highlighting how physical activity follows distinct patterns that are not always consistent with racial/ethnic differences in pain status, particularly when examining Black–White differences.

Our results showed that Blacks were less likely to engage in regular physical activity, despite not experiencing excessive pain compared to Whites and Hispanics. This suggests that low rates of physical activity among elderly Blacks may be due to additional indicators other than reported disadvantages in socioeconomic status, physical functioning, health status, and pain. In addition, our results also suggest that pain is not a strong predictor of physical activity among older Hispanics, as pain was highly prevalent in this group, but this did not translate into lower rates of physical activity among Hispanics compared to Whites. Indeed, similar to Blacks, no level of pain was associated with the odds of regular light or moderate/vigorous physical activity among Hispanic older adults, suggesting that older Hispanics may have developed some degree of resilience to the debilitating effects of pain. Further research is needed to confirm these results and determine the source of such resilience.

Our findings with respect to Blacks are similar to prior research documenting the lack of physical activity among racial/ethnic minorities when compared Whites (Crespo et al., 1996; Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000; NCHS, 2007). For example, in recent studies evaluating physical activity, older Black adults (as well as Mexican Americans) were found to be more likely to participate in lower levels of physical activity than Whites (Adams-Campbell et al., 2000; Crespo et al., 2000; Marquez, Neighbors, & Bustamante, 2010; Marshall et al., 2007). Yet, with regard to the type of physical activity, these population groups are less likely to participate in leisure-time physical activity, but are more likely to participate in occupational activities that are more physically demanding than Whites (Crespo et al., 2000; Marquez et al., 2010). It may be that engagement in specific types of occupational activities precludes participation in the type of physical activity measured in this study.

Changes in functional status or functional capacity may be partially responsible for race differences in physical activity. Seeman and colleagues (1994) found that Whites and males reported better physical performance than Blacks. Manton and Gu (2001) further established that older Blacks demonstrated diminished functional capacities compared to younger Blacks and other race groups. Other investigations report similar findings, with persons from diverse racial backgrounds performing at a less than optimal level than Whites (Crespo et al., 1996; Hardt et al., 2008; Helme & Gibson, 1999; Kelley-Moore & Ferraro, 2004; Manton & Gu, 2001). This is an important observation considering the impact physical impairments will have on the abilities of older adults, particularly those from diverse race and ethnic populations, to function within their environmental and social contexts.

Consistent with these previous studies, our study found a higher level of functional limitations among Blacks and Hispanics, compared to Whites. Moreover, after controlling for the influence of functional status and health, we found no significant differences in the odds of physical activity between Whites and Hispanics, suggesting perhaps that elevated

functional limitations are responsible for the relatively low rates of physical activity among Hispanics found in the bivariate analyses (see Table 1). However, for Blacks, functional status offers a less compelling explanation because even after controlling for functional status, rates of physical activity were significantly lower than rates among Whites.

The presence of cultural determinants may be another plausible explanation for the reported differences in physical activity levels between Blacks and Hispanics. Ham and colleagues (2007) suggest that cultural attitudes regarding desirable and healthy body weight and acculturation influence physical activity behavior among Hispanic. Yet, despite these findings, there continues to be a lack of empirical research examining the impact of cultural determinants on physical activity participation among older minorities.

In addition to cultural influences, socioeconomic status may similarly influence physical activity participation among older adults (Adamson, Ben-Shlomo, Chaturvedi, & Donovan, 2003; Marquez et al., 2010; Wood, 2004). Empirical evidence suggests that low income and/or low educational attainment are significant indicators of decreased physical activity and greater functional limitations (Adamson et al., 2003; Crespo et al., 2000; Marshall et al., 2007). Data from the NCHS (2005) further corroborate these findings showing that individuals classified as low SES are more likely to be sedentary and to participate in physical activity less often than higher SES groups. A measure of education attainment was included in the current study in order to account for the effects of socioeconomic status. Similar to the case of functional status, controlling for education in our models seems to have largely accounted for the White-Hispanic difference in levels of physical activity that was observed in the bivariate analyses; as such we suspect that socioeconomic differences between White and Hispanic older adults explain a substantial portion of the disparity in prevalence of regular physical activity between these two groups. In contrast, Black-White disparities in physical activity participation remained evident even after controlling for education, suggesting that other sources are responsible for these disparities.

Another possible explanation for the low rate of physical activity among Blacks is the amount of physical strain and activity that many of these participants may have endured with the day-to-day responsibilities of their chosen occupation as young adults. The physical strain of these occupations, may have, over time, taken its toll on many of these individuals, thus leaving little desire for leisure-time physical activities (Marquez et al., 2010). As a result, the elderly adult may neither want to participate in physical activities (that require additional strain) nor have the capacity to complete the task(s) due to the physical “wear and tear” on their bodies. This recognizes the multidimensionality of physical activity, and the cultural and social contexts it has among diverse race and ethnic populations in the United States.

Limitations

A major advantage of this study is the use of a large community-dwelling sample representative of the U.S. older adult population. However, several limitations need to be considered when evaluating our results. First, the cross-sectional nature of the data precludes any inferences of causality for the role of pain in the decrease odds of physical activity seen with this sample. In addition, among older adults, attempts to describe physical activity are difficult. This is in part due to the inherent difficulty in assessing physical activity in older people where activity is less intense and more variable. Another limitation of this study is that occupational physical activity was not measured. This is an important limitation because the amount of physical activity individuals engage during their leisure time has been shown to be inversely related to the amount of physical activity at work. In addition, occupational physical activity is known to differ by social class and race/ethnicity (Crespo et al., 1996; Crespo et al., 2000; Marshall et al., 2007).

Another limitation is that our understanding of the epidemiology of pain remains limited. Many approaches used to estimate the prevalence of pain have used self-report or nonspecific measurement instruments. Self-report, representativeness, and nonresponses are inherent sources of potential biases, although questionnaires were completed confidentially. Furthermore, self-report is subject to error and may be masked by behavioral symptoms (e.g., depression) and clinical conditions. While some studies focus on pain-related medical conditions, the pain assessed in our study was nonspecific, thus limiting the ability to generalize our findings to other populations. Another potential limitation is that the cross-sectional nature of the study made it difficult to test or assume the temporal order of the relationship between pain and behavioral symptoms, pain and related disability, or the relationship between pain and chronic medical conditions. Further investigations are necessary to determine whether these findings can be generalized to broader populations.

Cultural determinants such as acculturation may similarly influence both actual pain and the reporting of pain behaviors, suggesting that those who are less acculturated (racial/ethnic groups) and who have recently arrived in the United States, may find it more difficult to respond to pain questions that lack sensitivity and awareness to culture and/or language. Interviews with respondents in the HRS sample were conducted in English and Spanish; however, the level of acculturation for this sample remains unknown.

Conclusions

The public health impact of inadequate levels of physical activity among older adults is significant, given the substantial increase expected in the percentage of racial and ethnic minority older adults that is estimated to occur over the next 40 years (Arias, 2004). With the increase in the racially and ethnically diverse population we need to gain a better understanding of the plausible explanations for the discrepancies in self-reported levels of physical activity among older adults. Additional longitudinal research studies with larger numbers of ethnic minorities are needed to improve our understanding of these differences and to assess potential causal roles. Indeed, studies are needed to fully ascertain the discrepancies seen in this study among Black and Hispanics physical activity participation in the presence of pain. Furthermore, given the pain prevalence among Hispanics in this study and that pain is often a major independent risk factor for subsequent disability, more research is needed to investigate the resilience to severe pain among Hispanics found in this study. Finally, studies are needed to explore other plausible social and behavioral explanations for the lower levels of physical activity in ethnic minorities as compared to general population, and how these disparities may impact health outcomes.

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Table 1

Weighted Descriptive Statistics by Race and Ethnicity.

	Non-Hispanic White	Non-Hispanic Black	Hispanic
	<i>N</i> = 8,670	<i>N</i> = 1,531	<i>N</i> = 931
Gender			
Male (%)	43.9	39.1	43.5 [*]
Female (%)	56.1	60.9	56.5
Age (65-106 years)			
<i>M</i> (SD)	75.0±(7.4)	74.1±(7.3)	73.6±(7.3) ^{***}
Education			
<i>M</i> (SD)	12.8±(2.7)	11.1±(3.4)	8.2±(4.6) ^{***}
Level of Pain			
No pain (%)	66.4	69.7	63.1 [*]
Mild pain (%)	9.0	8.7	8.7
Moderate pain (%)	19.3	14.3	20.5 ^{**}
Severe pain (%)	5.3	7.3	7.7 ^{**}
ADL count (0-5)			
<i>M</i> (SD)	.3±(.9)	.6±(1.2)	.6±(1.3) ^{***}
Health conditions (0-8)			
<i>M</i> (SD)	2.5±(1.4)	2.7±(1.4)	2.5±(1.5) ^{***}
Light physical activity (housework) 2× a week			
Yes (%)	56.2	40.6	49.1 ^{***}
No (%)	43.8	59.4	50.9
Moderate/vigorous physical activity 2× a week or more			
Yes (%)	55.8	41.2	48.5 ^{***}
No (%)	44.2	58.8	51.5

M (SD): Mean ± Standard Deviation^{*}
p < .05.^{**}
p < .010.^{***}
p < .001.

Table 2

Odds Ratios for the Association Between Pain and Physical Activity.

	Light physical activity				Moderate/vigorous physical activity			
	Model 1		Model 2		Model 3		Model 4	
	Exp(B)	CI	Exp(B)	CI	Exp(B)	CI	Exp(B)	CI
Race/ethnicity								
White	Reference category		Reference category		Reference category		Reference category	
Black	.551	(0.48, 0.64)	.550	(0.47, 0.64)	.677	(0.58, 0.79)	.664	(0.57, 0.77)
Hispanic	.901	(0.75, 1.08)	.894	(0.75, 1.07)	1.145	(0.95, 1.38)	1.135	(0.94, 1.37)
Age	.957	(0.95, 0.96)	.956	(0.95, 0.96)	.974	(0.97, 0.98)	.973	(0.97, 0.98)
Gender								
Female	Reference category		Reference category		Reference category		Reference category	
Male	.528	(0.49, 0.57)	.521	(0.48, 0.57)	1.330	(1.23, 1.44)	1.299	(1.20, 1.42)
Age	.957	(0.95, 0.96)	.956	(0.95, 0.96)	.974	(0.97, 0.98)	.973	(0.97, 0.98)
Education	1.038	(1.02, 1.05)	1.036	(1.02, 1.05)	1.091	(1.08, 1.11)	1.090	(1.07, 1.11)
ADL count	.627	(0.59, 0.66)	.641	(0.61, 0.68)	.599	(0.57, 0.64)	.620	(0.58, 0.66)
Health conditions	.883	(0.86, 0.91)	.890	(0.86, 0.92)	.814	(0.79, 0.84)	.828	(0.80, 0.85)
Pain								
No pain			Reference category				Reference category	
Mild pain			1.005	(0.87, 1.16)			.887	(0.77, 1.02)
Moderate pain			.954	(0.86, 1.06)			.788	(0.71, 0.88)
Severe pain			.711	(0.59, 0.86)			.740	(0.61, 0.90)
Constant	46.039		49.992		5.137		5.993	
Log likelihood	13,985.4		13,934.4		13,835.4		13,775.7	
N	11,082		11,051		11,075		11,044	

Table 3

Odds Ratios for the Association Between Pain and Physical Activity by Race/Ethnicity.

	Light physical activity			Moderate/vigorous physical activity		
	White	Black	Hispanic	White	Black	Hispanic
	Exp(B) (CI)	Exp(B) (CI)	Exp(B) (CI)	Exp(B) (CI)	Exp(B) (CI)	Exp(B) (CI)
Gender						
Female	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)
Male	.533 (0.49, 0.59)	.512 (0.41, 0.64)	.344 (0.26, 0.46)	1.301 (1.19, 1.43)	1.192 (0.95, 1.49)	1.409 (1.07, 1.86)
Age						
	.952 (0.95, 0.96)	.984 (0.97, 1.00)	.977 (0.96, 1.00)	.973 (0.97, 0.98)	.970 (0.95, 0.99)	.978 (0.96, 1.00)
Education						
	1.046 (1.03, 1.07)	1.012 (0.98, 1.05)	1.020 (0.99, 1.05)	1.113 (1.09, 1.13)	1.066 (1.03, 1.10)	1.009 (0.98, 1.04)
ADL count						
	.620 (0.58, 0.66)	.732 (0.65, 0.83)	.676 (0.59, 0.78)	.574 (0.53, 0.62)	.744 (0.66, 0.84)	.772 (0.68, 0.88)
Health conditions						
	.899 (0.87, 0.93)	.862 (0.79, 0.94)	.824 (0.74, 0.91)	.826 (0.80, 0.86)	.874 (0.81, 0.95)	.853 (0.77, 0.94)
Pain						
No pain	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)
Mild pain	.934 (0.79, 1.10)	1.070 (0.73, 1.57)	2.479 (1.46, 4.22)	.878 (0.75, 1.03)	1.015 (0.69, 1.50)	.961 (0.60, 1.55)
Moderate pain	.935 (0.83, 1.06)	1.055 (0.77, 1.45)	1.296 (0.89, 1.88)	.781 (0.69, 0.88)	.775 (0.56, 1.08)	1.099 (0.77, 1.57)
Severe pain	.693 (0.56, 0.86)	.821 (0.51, 1.32)	.865 (0.49, 1.54)	.786 (0.63, 0.98)	.617 (0.38, 1.01)	.624 (0.35, 1.13)
Constant	59.791	4.531	12.830	4.629	5.473	6.709
Log likelihood	10,815.0	1,937.9	1,146.1	10,640.2	1,913.1	1,202.7
N	8,613	1,512	924	8,608	1,513	923