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The Role of Stress in Understanding Differences in Sedentary Behavior in Hispanic/Latino Adults: Results From the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study

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Abstract

Background—Chronic stress and/or lifetime traumatic stress can create a self-reinforcing cycle of unhealthy behaviors, such as overeating and sedentary behavior, that can lead to further increases in stress. This study examined the relationship between stress and sedentary behavior in a sample of Hispanic/Latino adults (N = 4244) from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study.

Methods—Stress was measured as the number of ongoing difficulties lasting 6 months or more and as lifetime exposure to traumatic events. Sedentary behavior was measured by self-report and with accelerometer. Multivariable regression models examined associations of stress measures with time spent in sedentary behaviors adjusting by potential confounders.

Results—Those who reported more than one chronic stressor spent, on average, 8 to 10 additional minutes per day in objectively measured sedentary activities ($P < .05$), whereas those with more than one lifetime traumatic stressor spent (after we adjusted for confounders) 10 to 14 additional minutes in sedentary activities ($P < .01$) compared with those who did not report any stressors. Statistical interactions between the 2 stress measures and age or sex were not significant.

Conclusion—Interventions aimed at reducing sedentary behaviors might consider incorporating stress reduction into their approaches.

Keywords

accelerometer; chronic stress; gender

Sedentary behavior refers to activities that require minimal engagement in body movement (eg, prolonged sitting, computer/video game use), resulting in low levels of energy expenditure (≤1.5 metabolic equivalents).[1,2] Although physical inactivity is often conflated with sedentary behavior they are distinct constructs.[2–4] In the literature, physical inactivity is often used as a synonym for “sedentary behavior,” suggesting that sedentary behavior is the absence of physical activity.[3,4] However, sedentary behavior is different from physical inactivity because an individual can be sufficiently active according to the physical activity guidelines but still spend prolonged time being sedentary (eg, watching television).[5]

In an analysis of National Health and Nutrition Examination Study (NHANES) data (2009–2010), the average time spent in sedentary behavior in the form of sitting was 285 min/d for males and 281 min/d for females.[6] In addition, results from the American Time Use Survey suggest that watching television accounted for about half of the time spent in leisure activities by the working adult population.[7] Furthermore, recent population-based estimates of accelerometer-derived sedentary time have reported that US adults spend, on average, 54.9% of their waking hours sedentary.[8] There is also a trend for increased sitting time with increasing age for all Mexican American and Hispanic/Latino females and non-Hispanic/Latino black males, even after adjusting for education.[9] This is particularly important because time spent in sedentary behaviors has been independently associated with increased risk of weight gain, metabolic syndrome, diabetes, and heart disease.[10,11] With the continued increase in the prevalence of overweight and obesity in the United States, in particular among Hispanics/Latinos, sedentary behaviors have emerged as an important target of health promotion and obesity- and disease-prevention efforts.[5]

A salient issue when evaluating sedentary behavior is determining the most influential predictors, particularly in racially/ethnically diverse populations. The social vulnerability hypothesis suggests that socially disadvantaged groups are disproportionately vulnerable to some of the risk factors that may lead to health harming behaviors such as overeating and more inactive time.[12] For example, racially and ethnically diverse populations experience numerous disadvantages that may threaten health, increase vulnerability to disease, and exacerbate the harms of unhealthy behavior.[13–16]

In this context, high levels of stress can create a self-reinforcing cycle of unhealthy behaviors, such as overeating and decreased physical activity, that can lead to further increases in stress.[17] This cycle may be especially harmful for Hispanics/Latinos who might experience more numerous or severe stressors than non-Hispanic/Latino whites but have fewer means for mitigating their stress.[12,18–20] Some studies show that compared with non-Hispanic/Latino whites, Hispanics/Latinos report greater exposure to stressful life events (eg, death of a parent, incarceration), chronic stressors, discrimination, and perceived stress.[12,21–23]

Some of the research also reveals age related differences in that chronic stressors are more prevalent in late life as retirement and health-related dependency become increasingly common.[23] When evaluating sources of stress among older and younger adults, inadequate financial resources (because of unemployment or retirement) are a major source of chronic stress for these 2 populations. However, the findings are mixed with regard to whether the health outcomes of racial and ethnically diverse groups are equally affected when confronted with similar levels of stress.[20]

There is a need for studies that assess the association between different types of stress and other psychosocial predictors of sedentary behavior in particular among Hispanics/Latinos.[24] The Hispanic Community Health Study/Study of Latinos (HCHS/SOL)—Sociocultural Ancillary Study (SCAS) provides a unique opportunity to examine associations of these 2 forms of stress with sedentary behaviors among a diverse cohort of Hispanics/Latinos. The primary aim of this study is to examine relationships of lifetime traumatic stress and chronic stress with sedentary behavior among Hispanics/Latinos representing multiple ethnic background groups. In addition, because some studies suggest that associations of stress with health behavior or outcomes may vary by age and sex, we tested whether these factors modify the relationship.[13–16]

Methods

Study Population

The HCHS/SOL is a population-based cohort study of Latino adults living in 4 US urban centers (Bronx, NY; Chicago, IL; Miami, FL; and San Diego, CA). Individuals meeting inclusion criteria were 18- to 74 year-olds at recruitment, self-identified as Latino, were able to travel to the study field center, and planned to stay in the study area. Participants (N = 16,415) were recruited using a 2-stage area probability sampling design.[25,26]

The HCHS/SOL-SCAS recruited HCHS/SOL participants who completed their baseline exam within 6 months of the ancillary study enrollment start date and were representative of the parent study.[27] The SCAS administered a comprehensive assessment of psychosocial and sociocultural measures not collected in the HCHS/SOL, including stress measures. Of 5313 SCAS participants enrolled, 965 (18%) did not meet the accelerometer-compliance threshold of at least 10 hours wear time per day for 3 or more days and were excluded from the current analyses.[28,29] We excluded those wearing the accelerometer >23 hours/day (n = 39), indicating either device malfunction or constant wear time over at least 3 days and unsustainable sleep patterns not reflecting usual behavior. In addition, analyses excluded 35 individuals whose self-report sedentary behavior time data were missing. We ran separate models for self-report and accelerometer-measured sedentary time. However, we excluded those missing either measure from all models, to make the models comparable. We also excluded underweight participants (body mass index [BMI] < 18.5; n = 30), as this population is known to be at higher risk of comorbidities associated with frailty and disability. This yielded a final analytic sample of N = 4244.

Sedentary Behavior Assessment

Time spent in sedentary behavior was assessed both objectively and through self-report. During the HCHS/SOL baseline visit, participants were asked to wear an Actical B-1 accelerometer (model 198-0200-03; Respironics Co. Inc., Bend, OR) for 1 week. The accelerometer was worn above the iliac crest, which is the location most sensitive to the vertical movements consistent with ambulation.[30–32] Participants were instructed to undertake usual activities for 7 days while wearing the accelerometer, with removal only for swimming, showering, and sleeping.

The Actical was programmed to capture accelerations measured in “counts” in 1-minute epochs, beginning the morning after their baseline clinic visit and continuing for 7 days. Nonwear time was determined using the Choi algorithm,[33] defined as at least 90 consecutive minutes of zero counts, with allowance of 1 or 2 minutes of nonzero counts if no counts were detected in a 30-minute window before and after the 90-minute period. An adherent day for inclusion was defined as at least 10 hours of wear time. Raw data were summarized as average minutes per day spent in sedentary behavior on compliant days, according to the validated count cutoff of < 100 counts/min.[34,35]

Self-report time spent in sedentary behaviors at work, at home, getting to and from places, or with friends, but not sleeping, was assessed through the single Global Physical Activity Questionnaire (GPAQ) question, “How much time do you usually spend sitting or reclining on a typical day?” This question has been shown to be valid against objectively measured sedentary behavior in a Hispanic/Latino population.[36–38] In a repeatability analyses study (n = 58) as part of HCHS/SOL, test-retest reliability for self-reported time spent in sedentary behavior was 0.49, as estimated from the intraclass correlation coefficient.

For ease of interpretation we present minutes per day in descriptive analyses for both self-report and objective measures of sedentary time, and we show minutes per day for adjusted differences between groups.

Assessment of Chronic and Traumatic Stress in the SCAS

Stress was evaluated in the context of 2 psychosocial domains (chronic and traumatic). Using the 8-item Chronic Burden scale[39] participants were asked about personal and family health problems, job difficulties, financial strain, relationship stress, and alcohol/drug abuse in someone close to them, with the option to report an additional unspecified difficulty. Each affirmative item was rated on a 3-point scale as “not very stressful,” “moderately stressful,” or “very stressful.” The chronic stress score was defined as the total number of stressors reported as moderately or very stressful lasting 6 months or more.[40]

The 10-item Traumatic Stress Schedule (TSS) was used to assess exposure to traumatic life events.[41] The TSS takes into account events occurring throughout the life span, encompassing natural disasters, exposure to war, serious injuries or property damage, forced violence, the threat of forced violence, unwanted sexual activity, or other “terrifying or shocking experiences” not mentioned.[41,42] For each item, participants were asked whether the event had occurred, whether it occurred more than once, and when it last happened. For this analysis, the traumatic stress score was defined as the sum of events occurring at least once over the life course. Therefore, we looked at groupings. However, because there are no established clinical thresholds, we used the simplest categorization based on tertile cut points. The tertiles were more effective than the quartiles for maintaining sufficient sample size in each group. Thus, for the purpose of analysis, both stress variables were categorized as 0, 1 to 2, and 3 or more stressful events. A similar approach has been used previously by one of the coauthors.[40]

Covariates

Categorically defined covariates as self-reported at the HCHS/SOL baseline interview were age (18–34, 35–54, or 54–74), sex, annual household income (< \$10,000, \$10,000–\$20,000, \$20,001–\$40,000, \$40,001–\$75,000, or > \$75,000), education (< high school, high school graduate or equivalent, or > high school), current employment status (retired or not employed, employed part-time, or employed full-time), Hispanic/Latino background (Cuban, Dominican, Mexican, Puerto Rican, Central American, South American, or other/ more than one), and BMI group (normal, 18.5–25 kg/m^2; overweight, 25– < 30 kg/m^2; obese, ≥ 30 kg/m^2). The baseline examinations were conducted by trained bilingual interviewers (in person) and included comprehensive physiological, behavioral, and sociodemographic assessments.[26,27] From the results of these interviews, an index of comorbid conditions (which included a composite of cardiovascular diseases, such as myocardial infarction, coronary insufficiency, and angina; cerebrovascular events, including ischemic stroke, hemorrhagic stroke, and transient ischemic attack; peripheral artery disease, including intermittent claudication; heart failure; obstructive lung disease; and a self-reported history of cancer) was derived to control for potential physical limitation as a confounding factor.[26,27] Each of the following conditions counted for 1 point in the index: Diabetes was defined according to the American Diabetes Association definition as either fasting glucose ≥ 126 mg/dL, 2-hour oral glucose tolerance test ≥ 200 mg/dL, glycated hemoglobin A_{1c} ≥ 6.5%, or antidiabetes medication use (as determined through scanning of medications used in the past 4 weeks). Cardiovascular disease was defined as a composite of coronary heart disease (myocardial infarction, coronary insufficiency, and angina), cerebrovascular events (including ischemic stroke, hemorrhagic stroke, and transient ischemic attack), peripheral artery disease (intermittent claudication), and heart failure. Obstructive lung disease was based on spirometry ratio (forced expiratory volume in 1 second/forced vital capacity) < 0.70. Self-reported history of cancer was measured with the question “Has a doctor ever said that you have cancer or a malignant tumor?”

To preserve external comparability with published research, we examined physical activity objectively as minutes spent in bouts of moderate-to-vigorous physical activity (MVPA), with a bout defined as at least 10 minutes in which 8 of each 10 rolling minutes met or exceeded the threshold of 1535 counts/min.[28] A 4-level categorical MVPA variable was used for descriptive analyses (inactive, low activity, medium activity, high activity) according to cut points defined by the 2008 Physical Activity Guidelines for Americans, with the continuous MVPA variable (minutes per day) being used for adjustment in multivariable models.[43]

Statistical Analysis

All results were estimated using sampling weights that were nonresponse-adjusted, trimmed, and calibrated to 2010 US Census characteristics by age, sex, and Hispanic/Latino background in each field site's target population. Because of the large number of participants excluded because of missing or incomplete accelerometer data (18%),[44] analyses were adjusted for missing data using inverse-probability weighting on the basis of sociodemographic and health-related variables that predicted accelerometer adherence.[45] Analyses were performed using SAS software (version 9.3; SAS Institute, Cary, NC) and SUDAAN (release 11.0.1; RTI International, Research Triangle Park, NC).

The mean accelerometer wear time in our analytic sample was 16.3 hours (SD = 2.9). Despite excluding those with nonadherence or wear time >23 hours/day, we observed a high correlation between wear time and time spent in sedentary behaviors (weighted $R^2 = 0.8$). To account for this, we adjusted for wear time as a continuous variable in all analyses of objective sedentary behavior. Estimates of time spent in sedentary behaviors were calculated as predicted marginal effects from linear regression models, standardizing to a 16-hour waking day across field centers, to preserve external comparability across studies with different mean wear times.

We analyzed chronic and lifetime traumatic stress as both continuous and categorical variables and found similar effects. Thus, all adjusted analyses are presented representing chronic and lifetime traumatic stress as categorical variables for ease of interpretation and to capture possible nonlinear effects. All analyses of sedentary behavior (minutes per day or hours per day as appropriate) as continuous dependent variables were conducted using multivariable linear regression models. *P* values corresponding to Wald *F* statistics and 95% confidence intervals were computed in SUDAAN on the basis of variance estimates derived from Taylor series linearization to account for the complex sampling scheme.[46] First, minimally adjusted models included age and sex as covariates in addition to adjustment for accelerometer wear time and field center. Second, models additionally adjusted for the a priori-specified variables income, education, employment status, BMI, and chronic conditions. Third, models further adjusted for objectively measured MVPA. *P* values for a trend of higher or lower sedentary time across levels of stress were computed by entering stress variables into the models as ordinal variables.

To explore the hypothesis that the relationship between stress and sedentary behavior varies by age and sex, we ran models including cross-product interaction terms (age × stress; sex × stress) as well as main effects, while adjusting for the variables listed above.

Results

Baseline characteristics of the target population, overall and by levels of chronic stress, are presented in Table 1. The median numbers of chronic and lifetime traumatic stressors were 1 and 2, respectively (range, 0–8). Those with 3 or more chronic stressors were generally more likely to be middle-aged (35–54 years) and to have lower annual household incomes compared with those with no chronic stressors. With regard to lifetime traumatic stressors, those with 3 or more stressors were also more likely to be unemployed or retired, to be obese, and to have a higher number of chronic conditions compared with those with no traumatic stressors (see Table 1S-Supplement table).

Age-adjusted analyses indicated that those with a higher number of stressors spent more time in sedentary behaviors, as assessed through both objective and self-report measures (Table 2).

Objectively Measured Sedentary Behavior

Individuals with 3 or more chronic stressors spent an estimated 744 min/d in sedentary behaviors (77.5% of accelerometer wear time), significantly more than their less-stressed counterparts. The time spent in objectively measured sedentary behaviors also differed by number of lifetime traumatic stressors.

These differences in objectively measured sedentary time over levels of chronic stressors and lifetime traumatic stressors continue to be apparent in models adjusted for age and sex (Table 3, model 1; *P* for trend < 0.001). Although the estimates were attenuated after adjusting for education, employment status, chronic conditions, and other covariates (model 2), the trend toward higher sedentary time in groups with more stress remained statistically significant (.018 and .010, respectively).

We did not observe statistical interaction between chronic stress and sex or age in predicting time spent in sedentary behaviors, measured objectively (data not shown; *P* for interaction: .59 for sex; .53 for age). Likewise, we did not observe interaction between traumatic life events and sex or age (data not shown; *P* for interaction, 0.58 for sex; 0.85 for age).

Self-Reported Sedentary Behavior

Regression models with self-reported sedentary time as the dependent variable yielded results similar to those examining objectively ascertained data (Table 4). After adjustment for covariates, persons with 1 or 2 and 3 or more chronic stressors spent, on average, an additional 30.5 and 37.4 min/d in sedentary behaviors, respectively, compared with those with no chronic stressors (*P* for trend: .000). A similar pattern was observed with respect to traumatic life stressors (*P* = .005).

The interactions for the self-reported model were similar to the objective measured model. All *P* values were greater than 0.3.

Discussion

With the continued increase in the prevalence of chronic disease in the United States, particularly among Hispanics/Latinos, sedentary behaviors have emerged as an important target of health promotion for obesity- and disease-prevention efforts. Yet, to our knowledge, this is the first study evaluating the relationship of traumatic and chronic stress with sedentary behavior in a Hispanic/Latino sample.

Our findings show an association between chronic and traumatic stress and increased time spent in sedentary behavior. Compared with participants who did not report any stressors, those who reported more than one chronic stressor spent, on average, an additional 8 to 10 min/d in objectively measured sedentary activities, whereas those with more than one lifetime traumatic stressors spent an additional 10 to 14 min/d in sedentary activities. Our findings further indicate that stress is a risk factor for sedentary behavior among Hispanic/ Latino adults regardless of sex and age. Consquently, our study findings support and extend those of Mouchacca et al[24] and Krueger et al,[12] who examined the role of psychological and perceived stress and health behaviors and found that higher stress was associated with an increase in time spent in sedentary behavior among women and a nationally representative sample.

There is compelling evidence suggesting that some of the racial and ethnic disparities in health and unhealthy behaviors stem from differential exposure and vulnerability to stressors.[15,23] Studies documenting poorer diet, smoking, and alcohol intake in the presence of stress all provide empirical support for this idea.[41,47] However, given the inconsistencies in the stability of the results across study findings, prior research offers limited insight into the role of chronic and traumatic stress in shaping sedentary behavior in racial and ethnically diverse groups. Consistent with the concept of differential vulnerability, our study found that individuals in situations of high stress were more likely to engage in sedentary behaviors, perhaps as a way to make them feel better. Therefore, stressed individuals in our study, just as in the Mouchacca et al[24] and Krueger et al[12] studies, may have sought comfort by spending time in sedentary behaviors as a distraction from stressful events. Understanding the length of time Hispanics/Latinos spend in sedentary behaviors as well as determining the predictors of sedentary behavior is important to inform the development of effective public health strategies to reduce the prevalence of sedentary behaviors among Hispanics/Latinos.

The primary limitation of this study is its cross-sectional nature. The direction of the associations found in this study cannot be completely ascertained given the cross-sectional design. Another issue is that self-reported sedentary behavior is likely to be prone to misreporting bias and underestimation/overestimation error.[4,5] However, to address these issues, our study also examined objectively measured sedentary behavior. Additional strengths of the study include the large sample of US Hispanics/Latinos representing different background groups, which makes the findings more generalizable to community-dwelling Hispanics/Latinos. Our study further extends previous research by using 2 measures of stress (chronic and lifetime traumatic) as predictors of sedentary time measured by self-report and objectively among Hispanics/Latinos. The covariates included in the statistical models are similar to those reported in prior studies examining predictors of sedentary behavior in other non-Hispanic/Latino populations.[31]

Our study findings, linking stress to sedentary behavior, have tremendous public health relevance because there seems to be a lack of interventions that specifically incorporate stress management along with efforts to increase physical activity. There is a growing body of research suggesting that the introduction of stress-management strategies may confer particular advantages for weight reduction among those engaged in behavior-changing interventions, particularly among those experiencing chronic stress.[22] A comprehensive behavioral stress-management program can touch on emotional coping and other stress-management strategies that can lead to the reduction of sedentary behavior. In addition, recent qualitative work indicates that a stronger emphasis on stress management within the context of weight management has appeal for racially diverse populations.[40,48] If stress is an important precursor to sedentary behavior, then interventions that promote the increase of physical activity and reduction of sedentary time may benefit from the inclusion of stress-management techniques. Meanwhile, further research is required using prospective designs to better examine the direction of associations between chronic and lifetime traumatic stress and sedentary behavior in diverse Hispanic/Latino populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Bivariate Associations Between Social/Behavioral Factors and Chronic Stress Among Hispanic/Latino Adults Living in 4 US Urban Centers, 2008–2011[a]

		Overall (N = 4244)	No chronic stressors (n = 1862)	1–2 Chronic stressors (n = 1431)	3 or More chronic stressors (n = 731)
Variable	**n[b]**	**% (95% CI)**	**% (95% CI)**	**% (95% CI)**	**% (95% CI)**
Age groups *					
18–34	754	33.6 (31.2–36.1)	36.9 (33.6–40.4)	36.1 (31.8–40.8)	23.3 (17.7–29.9)
35–54	2114	43.3 (40.9–45.6)	42.4 (39.6–45.3)	40.0 (36.4–43.7)	53.4 (45.9–60.8)
55+	1376	23.2 (21.3–25.2)	20.7 (18.1–23.4)	23.9 (20.9–27.1)	23.3 (18.3–29.3)
Sex *					
Female	2649	54.7 (52.3–57.1)	50.9 (47.6–54.1)	57.5 (53.7–61.3)	61.1 (54.0–67.8)
Male	1595	45.3 (42.9–47.7)	49.1 (45.9–52.4)	42.5 (38.7–46.3)	38.9 (32.3–46.1)
Annual household income **					
< $10,000	682	15.7 (14.0–17.5)	11.3 (9.6–13.2)	17.6 (14.7–21.0)	21.0 (16.5–26.4)
$10,000–$20,000	1336	30.2 (28.0–32.6)	29.6 (26.8–32.6)	30.8 (27.3–34.6)	30.4 (24.9–36.5)
$20,000–$40,000	1286	29.9 (27.1–32.8)	33.2 (29.9–36.7)	26.6 (23.1–30.5)	29.9 (21.1–40.5)
≥ $40,000	596	15.2 (12.9–17.8)	17.2 (14.2–20.6)	14.9 (12.1–18.3)	11.7 (7.6–17.7)
Missing income	344	9.0 (7.8–10.4)	8.8 (7.1–10.8)	10.1 (8.0–12.6)	7.0 (4.6–10.6)
Education					
Less than high school	1573	32.9 (30.2–35.6)	31.3 (28.1–34.6)	34.3 (30.1–38.7)	33.3 (26.9–40.3)
High school equivalent	1091	28.3 (25.8–30.9)	30.4 (27.5–33.6)	24.7 (21.6–28.0)	30.6 (22.0–40.8)
Greater than high school	1573	38.9 (36.1–41.7)	38.3 (34.7–42.0)	41.1 (37.0–45.3)	36.2 (29.9–43.0)
Employment status **					
Retired or not employed	2234	55.5 (52.9–58.1)	48.6 (45.2–52.1)	55.2 (51.0–59.3)	71.3 (64.8–77.1)
Employed < 35 h/wk	738	18.1 (16.3–20.1)	19.1 (16.4–22.1)	20.7 (17.1–24.9)	11.5 (8.2–15.9)
Employed at least 35 h/wk	1229	26.4 (24.4–28.5)	32.3 (29.3–35.4)	24.1 (20.9–27.6)	17.2 (13.1–22.2)
Study center **					
Bronx	1091	30.6 (26.8–34.8)	23.8 (19.9–28.2)	34.4 (29.3–39.9)	44.6 (36.0–53.5)
Chicago	1147	16.2 (13.7–19.2)	17.6 (14.2–21.7)	14.3 (11.4–17.7)	13.2 (10.1–17.1)
Miami	926	28.6 (23.4–34.4)	29.6 (23.8–36.2)	29.2 (23.2–35.9)	21.1 (15.6–27.9)
San Diego	1080	24.5 (20.7–28.8)	29.0 (24.0–34.5)	22.1 (17.5–27.6)	21.1 (15.8–27.7)
BMI *					
Normal	809	21.3 (19.5–23.1)	22.6 (20.0–25.4)	22.2 (19.2–25.5)	15.7 (12.1–20.2)
Overweight	1627	38.0 (35.6–40.5)	39.9 (36.4–43.6)	35.9 (32.4–39.5)	37.8 (29.3–47.2)
Obese	1803	40.7 (38.4–43.1)	37.5 (34.3–40.9)	41.9 (38.1–45.8)	46.5 (38.8–54.4)
Comorbid conditions [c], **					
None	2009	56.5 (54.2–58.7)	65.6 (62.4–68.7)	55.3 (51.3–59.2)	39.1 (30.9–48.0)
One	1285	26.5 (24.7–28.5)	23.6 (20.9–26.5)	26.5 (23.4–29.9)	32.4 (26.3–39.3)
Two or more	950	17.0 (15.4–18.7)	10.8 (9.2–12.8)	18.2 (15.7–21.1)	28.4 (23.3–34.2)

Variable	n[b]	Overall (N = 4244) % (95% CI)	No chronic stressors (n = 1862) % (95% CI)	1–2 Chronic stressors (n = 1431) % (95% CI)	3 or More chronic stressors (n = 731) % (95% CI)
MVPA level[d]					
Inactive	1877	43.7 (40.8–46.6)	42.6 (39.0–46.2)	41.9 (37.7–46.2)	48.0 (39.6–56.5)
Low	1838	42.2 (39.5–44.8)	43.0 (39.8–46.2)	43.4 (39.3–47.5)	39.2 (32.4–46.5)
Medium	357	9.3 (7.9–10.9)	9.9 (8.0–12.3)	9.6 (7.6–12.1)	8.1 (5.5–11.8)
High	172	4.8 (3.9–5.9)	4.6 (3.3–6.3)	5.1 (3.7–7.1)	4.7 (2.6–8.5)

Abbreviations: CI, confidence interval; BMI, body mass index; MVPA, moderate-to-vigorous physical activity.

[a] Values are column percentages and 95% CIs, taking into account the complex sampling scheme of the Hispanic Community Health Study/Study of Latinos.

[b] May not sum to column total because of missing data.

[c] Conditions considered were cardiovascular disease, prevalent diabetes, prevalent obstructive lung disease (based on the forced expiratory volume in 1 second-to-forced vital capacity ratio), self-report of activity-limiting joint pain, and history of cancer.

[d] Objectively measured MVPA, based on 2008 US physical activity guidelines.[45]

[*] $P < .01$; values are based on c^2 tests for any difference between groups.

[**] $P < .001$; values are based on c^2 tests for any difference between groups.

Table 2

Age- and Field-Center–Adjusted Associations of Stress Variables With Sedentary Behavior

		Objective Sedentary Behavior[a]		Self-Report Sedentary Behavior[b]	
Variable	**n**	**min/d (95% CI)**	***P***	**min/d (95% CI)**	***P***
Number of chronic stressors			**		*
0	1862	714 (702–720)		246 (234–258)	
1 or 2	1431	726 (720–732)		276 (258–288)	
3 or more	731	744(726–756)		288 (264–306)	
Lifetime traumatic stressors			*		**
0	805	714 (702–720)		240 (222–252)	
1 or 2	1887	726 (714–732)		264 (252–276)	
3 or more	1504	726 (720–738)		276 (264–294)	

[a]Accelerometer-measured sedentary behavior was adjusted for wear time and standardized to a 16-hour waking day. The value can be interpreted as the mean number of hours sedentary, conditional on 16 hours of waking wear time.

[b]Self-reported sedentary behavior computed on the basis of the single question “How much time do you usually spend sitting or reclining on a typical day?”

*$P < .05$; values test for a linear trend and are based on Wald tests from regression models in which independent variables are treated as continuous.

**$P < .001$; values test for a linear trend and are based on Wald tests from regression models in which independent variables are treated as continuous.

Table 3

Multivariable Analyses of the Relationship Between Stress and Objectively Measured Sedentary Behavior

		Model 1[a]			Model 2[b]			Model 3[c]		
Variable	n[d]	β [e]	95% CI	*P* trend	β [e]	95% CI	*P* trend	β [e]	95% CI	*P* trend
Number of chronic stressors				.000			.031			.006
0	1844	Reference	—		Reference	—		Reference	—	
1 or 2	1409	12.6	(2.7–22.6)		7.6	(−2.0 to 17.2)		9.2	(0.2–18.3)	
3 or more	718	28.4	(13.8–43.0)		14.2	(0.4–28.0)		15.3	(3.7–26.9)	
Number of lifetime traumatic events				.001			.018			.010
0	794	Reference	—		Reference	—		Reference	—	
1 or 2	1863	14.1	(3.4–24.9)		10.8	(1.0–20.6)		8.2	(−1.5 to 17.8)	
3 or more	1484	18.8	(8.3–29.3)		14.3	(3.6–25.0)		14.4	(3.8–25.0)	

[a]Model 1 adjusted for field center, accelerometer wear time, age, and sex.

[b]Model 2 additionally adjusted for income, education, employment status, body mass index, and comorbid conditions.

[c]Model 3 additionally adjusted for objectively measured physical activity.

[d]Participants with missing values for any covariates were excluded from all models.

[e]Dependent variable: objectively measured time spent in sedentary behavior (< 100 counts/min), expressed in minutes per day.

Table 4

Multivariable Analyses of the Relationship Between Number of Stressors and Self-Reported Sedentary Behavior

		Model 1[a]			Model 2[b]			Model 3[c]		
Variable	**n[d]**	**β [e]**	**95% CI**	***P* trend**	**β [e]**	**95% CI**	***P* trend**	**β [e]**	**95% CI**	***P* trend**
Number of chronic stressors				.000			.000			.000
0	1844	Reference	—		Reference	—		Reference	—	
1 or 2	1409	31.4	(13.6–49.3)		29.6	(12.2–47.0)		30.5	(13.1–47.8)	
3 or more	718	42.9	(20.0–65.9)		37.1	(13.2–60.9)		37.4	(14.0–60.9)	
Number of lifetime traumatic events				.002			.003			.002
0	794	Reference	—		Reference	—		Reference	—	
1 or 2	1863	24.6	(6.5–42.8)		23.0	(5.4–40.5)		21.7	(4.4–39.0)	
3 or more	1484	36.3	(15.0–57.6)		33.4	(13.1–53.6)		33.5	(13.4–53.6)	

[a]Model 1 adjusted for field center, age, and sex.

[b]Model 2 additionally adjusted for income, education, employment status, body mass index, and comorbid conditions.

[c]Model 3 additionally adjusted for objectively measured physical activity.

[d]Participants with missing values for any covariates were excluded from all models.

[e]Dependent variable: self-reported time spent in sedentary behavior (Global Physical Activity Questionnaire sitting question), expressed in minutes per day.