



HHS Public Access

Author manuscript

J Phys Act Health. Author manuscript; available in PMC 2021 April 10.

Published in final edited form as:

J Phys Act Health. ; 18(1): 61–69. doi:10.1123/jpah.2020-0135.

Patterns of Sedentary Time in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) Youth

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Abstract

Background: Total sedentary time and prolonged sedentary patterns can negatively impact health. This study investigated rates of various sedentary pattern variables in Hispanic/Latino youth.

Methods: Participants were 956 youths (50.9% female) in the Hispanic Community Health Study/Study of Latinos Youth, a population-based cohort study of Hispanic/Latino 8- to 16-year-olds from 4 geographic regions in the United States (2012–2014). Total sedentary time and 10 sedentary pattern variables were measured through 1 week of accelerometer wear. Differences were examined by sociodemographic characteristics, geographic location, weekdays versus weekends, and season.

Results: On average, youth were sedentary during 67.3% of their accelerometer wear time, spent 24.2% engaged in 10- to 29-minute sedentary bouts, and 7.2% in 60-minute bouts. 8- to 12-year-olds had more favorable sedentary patterns (less time in extended bouts and more breaks) than 13- to 16-year-olds across all sedentary variables. Sedentary patterns also differed by Hispanic/Latino background, with few differences across sex, household income, season, and place of birth, and none between weekdays versus weekends.

Conclusions: Variables representing prolonged sedentary time were high among Hispanic/Latino youth. Adolescents in this group appear to be at especially high risk for unhealthy sedentary patterns. Population-based efforts are needed to prevent youth from engaging in increasingly prolonged sedentary patterns.

Keywords

bouts; accelerometer; children; adolescents; activity; sedentary

Evidence suggests that sedentary time is related to poor physical and psychosocial health outcomes, such as poor cardiometabolic health and depressive symptoms in youth.^{1–5} Furthermore, health behaviors established during childhood or adolescence, such as sedentary time and physical activity, often carry into adulthood.^{6,7} Some public health guidelines recommend limiting sedentary time, such as restricting daily recreational screen time to 1 to 2 hours and breaking up extended periods of sedentary time.^{8–10} Sedentary and screen time guidelines for youth in the United States are less specific, though limiting sedentary time is generally recommended.^{10,11}

Previous work has examined objectively measured total sedentary time in large population-based samples of youth¹² including in youth from the population-based Hispanic

Community Health Study/Study of Latinos (HCHS/SOL).^{13,14} However, less is known about youths' *sedentary patterns*, the manner in which sedentary time is accumulated throughout the day or week, such as the timing, duration, and frequency of sedentary bouts and breaks.¹⁵ Sedentary patterns are evaluated through breaks in sedentary time, median bout duration, and time spent in prolonged bouts (eg, lasting 30 min). Some findings suggest that sedentary patterns have been shown to negatively impact health over and above total sedentary time.¹⁶ Some studies have found that prolonged sedentary bouts, but not total sedentary time, were associated with higher weight status in youth.^{17–19} Evidence in Hispanics/Latino adults indicates that greater prolonged bouts of sedentary time were associated with higher risk levels on glycemic biomarkers.²⁰

Understanding rates of prolonged sedentary patterns in youth and differences by demographics (eg, age, sex, and socioeconomic status) may inform interventions and public health guidelines.²¹ This is particularly important in diverse population groups that experience higher rates of obesity and metabolically-related diseases, including Hispanics/Latinos.^{5,22} While previous studies described rates of total sedentary time and screen time in youth from the HCHS/SOL study,^{13,14} the objective of the current study is to show rates of *sedentary patterns* in Hispanic/Latino youth and differences by age group and sociodemographic factors.

Method

Study Population and Design

The HCHS/SOL study enrolled a population-based cohort of Hispanic/Latino adults in 2008–2011 (N = 16,415, ages 18–74 y) from 4 major metropolitan areas in the United States: Chicago, IL; Miami, FL; Bronx, NY; and San Diego, CA.^{23,24} The HCHS/SOL Youth (“SOL Youth”) is an ancillary study that enrolled 1466 children (8- to 16-years-old, 2012–2014) of a subset of HCHS/SOL adult participants.^{25,26} The study was conducted with approval from the institutional review boards at Albert Einstein College of Medicine, San Diego State University, University of Illinois at Chicago, University of Miami, University of Minnesota, Northwestern University, and University of North Carolina at Chapel Hill. Written informed consent and assent were obtained from parent/caregivers and their children, respectively.

Objective Assessment of Sedentary Time

The SOL Youth participants were requested to wear an Actical accelerometer (198-0200-03; Respironics Co. Inc, Bend, OR) on the hip for 7 days during waking hours, which has validity for use in adolescents.²⁷ The Choi algorithm²⁸ was used to remove nonwear time. Valid days were those with 8 hours and 16 hours of wear time. The upper limit was used because some participants appeared to have worn the device overnight, and in- and out-of-bed information was not collected. Sedentary time was defined using a cut point of <72 counts applied to 60-second epochs.^{13,17,27} Though shorter epochs (eg, 15 s) are recommended in youth physical activity research,²⁹ our research has shown that 60-second epochs have better validity when measuring sedentary bout patterns.³⁰ In total, 10 person-level sedentary pattern variables and total sedentary time were calculated by taking an

average across valid days. A break in sedentary time was defined as any time a sedentary epoch was followed by a nonsedentary epoch (no tolerance). *Time in bouts lasting 1 to 9, 10 to 29, 30 to 59, and 60 minutes* represented the percentage of wear time spent in sedentary bouts of these lengths. *Usual bout duration* was the bout duration at which 50% of all sedentary time was accumulated, with greater values equating to more prolonged bouts.³¹ *Median bout duration* was the median duration of all sedentary bouts. *Alpha* represented the relative proportion of shorter-to-longer bouts, with greater values indicating a proportionally greater number of short bouts.³² *Number of breaks/day* was the average number of sedentary breaks across days. *The fragmentation index*, or break rate, was calculated as the total number of breaks divided by total hours of sedentary time.³³ *Period* was the average duration between sedentary bouts. Each participant-level variable was created separately for weekdays, weekend days, and overall, which was calculated as $([\text{mean of weekdays} \times 5] + [\text{mean of weekend days} \times 2]) \div 7$. *Total sedentary time* was divided by total wear time to derive the percentage of wear time in sedentary time.

Sociodemographic and Grouping Variables

Sociodemographic characteristics included age, grouped as 8- to 12-years-old and 13- to 16-years-old because physical activity has been consistently shown to decline substantially between these age groups⁶; sex; annual household income, categorized as <20K, 21 to 40K, and >40K; parent/caregivers' highest level of education, categorized as no high school diploma or General Educational Development (GED), at most high school diploma or GED, and greater than high school diploma or GED; Hispanic/Latino background, grouped as Cuban, Dominican, Mexican, Puerto Rican, Central American, and South American heritage; study field center: Bronx, Chicago, Miami, San Diego; and place of birth, grouped as born in the 50 US states and born outside of the United States. Sociodemographic characteristics were provided by parents of participants at the baseline visit for HCHS/SOL Youth. Season was defined as spring (March, April, and May); summer (June, July, and August); fall (September, October, and November); and winter (December, January, and February) according to the week of accelerometer wear.

Statistical Analysis

All analyses were conducted in SPSS (version 24; IBM SPSS[®], Armonk, NY) using the complex samples analysis add on to account for the complex sampling design, including sampling weights, stratification (crossing of high/low Hispanic/Latino vs concentration and high/low SES), and clustering (US census block groups) in 2018–2019.²³ Of the 1466 SOL Youth participants, 956 were included in the present analyses. Participants were excluded because they did not have any valid days of accelerometer wear time ($n = 222$) or did not have 1 valid weekday and 1 valid weekend day ($n = 288$). The covariates household income, parent/caregiver education, and place of birth were missing for 4.6% of participants and were imputed based on other variables when possible or using the sample mode. Descriptive statistics were calculated for demographic and sedentary pattern variables. Complex survey linear regression models were run to test differences in sedentary dependent variables by sex, age, household income, field center, Hispanic/Latino background, weekdays versus weekends, and season, separately for each sedentary dependent variable. In each model, sex, age, Hispanic/Latino background, place of birth, household income, field

center, parent/caregiver education, wear time, number of weekdays, and number of weekend days were included as covariates. Sensitivity analyses were run for the weekday/weekend day models. Mixed Hispanic and other categories were not included in the models as the groupings had too few participants. Marginal means are presented. Significance level was set at .05. Effect sizes were calculated using group sample sizes and respective *F* values.

Results

Target Population Characteristics

Half (50.9%) of the participants were female. The majority reported identifying as Mexican Hispanic/Latino background (51.7%), being born in the US mainland (78.2%), and having a family income \leq \$20K (54.3%; Table 1). Youth spent an average of 67.3% of their wear time in sedentary behavior, with 21.8% of wear time in bouts lasting 1 to 9 minutes, 24.2% in bouts 10 to 29 minutes, 14.1% in bouts 30 to 59 minutes, and 7.2% in bouts \geq 60 minutes (Table 2). On average, participants accumulated half of their total sedentary time in sedentary bouts lasting \leq 15.9 minutes (ie, usual bout duration). Participants had a median bout duration of 3.5 minutes on average, which is lower than the average usual bout duration because of the high frequency at which short (eg, 1 min) bouts occur, but low overall contribution of short bouts to total sedentary time.

Differences by Sex and Age

Compared with males, females spent 0.9% more of their time in 1- to 9-minute bouts, had 2.8 more breaks per day, and a 0.2-minute shorter period (Table 3).

Compared with 8- to 12-year-olds, those 13 to 16 spent 10.2% more of their time sedentary and 2.4%, 7.5%, and 4.9% more of their time in bouts 10 to 29, 30 to 59, and \geq 60 minutes. Usual bout and median bout durations were 6.3 and 0.9 minutes longer in the older compared with the younger age group. The older age group spent 4.7% less of their time in 1- to 9-minute bouts, had 12.2 fewer breaks per day, 2.9 fewer breaks per sedentary hour, a lower alpha, and a shorter period by 0.6 minutes. The effect sizes for all the previously mentioned differences were medium to large ($d = .4-1.0$).

Differences by Household Income and Field Center

Youth in the lowest income group had the largest alpha and lowest percentage of time spent in 10- to 29-minute bouts, whereas those in the highest income group had the smallest alpha and highest percentage of time spent in 10- to 29-minute bouts (Table 3).

Youth from Miami and San Diego had less total sedentary time, a lower percentage of time spent in 30- to 59-minute bouts, a shorter usual bout duration, shorter median bout duration, and a higher alpha than youth from Bronx and Chicago.

Differences by Hispanic/Latino Background and Place of Birth

All sedentary variables differed across Hispanic/Latino background groups (Table 4). Youth with a Puerto Rican background generally had the most favorable profiles, spending more time in shorter bouts and less time in longer bouts than youth from other backgrounds, with

the exception of period. The Hispanic/Latino backgrounds with less favorable sedentary profiles differed across sedentary variables, though Central American youth had among the least favorable profiles of the Hispanic/Latino backgrounds for 8 of the 11 variables.

Youth born in the United States had a higher percentage of time spent in 1- to 9-minute bouts and lower percentage of time spent in 30- to 59-minute bouts than those not born in the United States.

Differences by Other Characteristics

Sedentary patterns did not differ between weekdays and weekend days, and results of the sensitivity analysis indicated that this pattern remained the same when limiting the sample to those who wore the accelerometer for at least 2 valid weekdays and 2 valid weekend days. Percentage of time spent in 1- to 9-minute bouts and number of breaks per day were highest in the summer ($M = 22.4$; $SE = 0.4$) and lowest in the spring ($M = 20.3$; $SE = 0.4$; $F = 8.4$; $P < .001$). The percentage of time in 30- to 59-minute bouts was highest in the winter ($M = 14.9$; $SE = 0.8$) and lowest in the summer ($M = 12.8$; $SE = 0.5$; $F = 2.9$; $P < .05$). Finally, the number of breaks per day was highest in the summer ($M = 71.9$; $SE = 1.0$) and lowest in the spring ($M = 67.9$; $SE = 1.1$; $F = 4.1$; $P < .05$).

Discussion

This is the first study to report rates of sedentary patterns in a large population-based sample of Hispanic/Latino youth in the United States. Sedentary patterns are important to study because evidence suggests that prolonged sedentary patterns may be detrimental to health over and above total sedentary time.^{16,18,19} While 67.3% of youths' waking hours were spent sedentary, 45.5% was spent in sedentary bouts 10 minutes, 21.3% was spent in bouts 30 minutes, and 7.2% was spent in bouts 60 minutes. Large differences were observed between age groups for every sedentary pattern variable, with 13- to 16-year-olds having more prolonged sedentary time than 8- to 12-year-olds. Smaller differences were also observed by sex, household income, field center, Hispanic/Latino background, place of birth, and season. These findings, paired with evidence of the negative impacts of sedentary time on health, suggest that significant population health efforts are needed to support sedentary reduction in Hispanic/Latino youth.

The large differences between age groups are of concern, with youth 13 to 16 demonstrating less favorable values for all sedentary variables. These findings parallel the trend of physical activity decreasing as children age, with early adolescence representing a critical developmental phase.⁶ Other evidence from HCHS/SOL suggests that age-related differences in prolonged sedentary time may be partly due to increases in screen time as children reach adolescence, particularly in computer/Internet and mobile phone time.¹⁴ The combined decrease in physical activity and increase in prolonged sedentary time could result in compounded negative health effects for adolescents as they grow into adulthood. These findings, along with evidence that health implications of sedentary time and physical activity can be independent,³⁴ reinforce the need for interventions that target *both* increased physical activity and reduced sedentary time.

Females had a shorter average duration between sedentary bouts (ie, period) compared with males, which appeared to be due to females having more breaks in sedentary time and shorter bouts than males. Thus, although total sedentary time was similar between males and females (slightly but not significantly higher in females), females are more likely than males to break up sedentary time. However, the high rates of prolonged sedentary time still warrant efforts targeting both males and females. The shorter duration between sedentary bouts for females as compared with males may also be partly due to less accrual of physical activity among females,¹⁴ because the duration between sedentary bouts comprises both light activity and moderate to vigorous physical activity.

Although small differences suggested that higher income was related to more prolonged sedentary time, only effects for 10- to 29-minute bouts were significant. This aligns with previous studies that have found inconsistent differences in sedentary/physical activity across socioeconomic indicators.³⁵ The rise in affordability and ubiquity of screen-based technology could explain these similarities in sedentary time and patterns across family income, as a recent report indicated that 95% of teenagers have access to a smartphone and that 88% have access to a computer or laptop, with small differences between high- and low-income categories.³⁶

Findings for several of the sedentary pattern variables suggested that youth from Bronx and Chicago had more prolonged sedentary time than those from Miami and San Diego. Those living in temperate climates of Miami and San Diego may be more likely to be outside, where prolonged sedentary time may be less likely. However, as seasonal differences were minimal, and there are overall mixed findings in the previous literature on the impact of season,³⁷ there may also be other environmental or cultural influences that affect sedentary activities across these geographic areas. Overall, while some geographic and cultural differences have emerged in previous studies of youth's physical activity, these differences have not yet emerged for sedentary patterns as this area has been minimally studied.³⁸

The finding that those born in the United States spent more time in short bouts and less time in 30- to 59-minute bouts than those born outside the United States somewhat contrasts findings in Hispanic/Latino adults, which indicate that greater acculturation is associated with less physical activity and more sedentary time.³⁹ Similarly, acculturation has been associated with risk for obesity-related behaviors in Hispanic/Latino youth.⁴⁰ Place of birth may impact youth behaviors differently than adult behaviors because youth may acculturate more quickly through cultural integration with peers in the school setting.⁴¹ There could also be a strong influence of parental physical activity and sedentary habits on that of their children.¹³

The differences across Hispanic/Latino backgrounds suggest that cultural and/or biological factors may play a role in influencing sedentary patterns. Some backgrounds, including Central American background, appear to be at greatest risk for poor sedentary patterns. As the current study is novel in this investigation of Hispanic/Latino backgrounds in relation to sedentary pattern variables, further research is needed to understand the role of cultural factors. Another study in this population-based sample also found differences across Hispanic/Latino backgrounds, pertaining to moderate to vigorous physical activity. Physical

activity was highest in youth of Mexican and Puerto Rican backgrounds and lowest in youth of Central American, Cuban, and Dominican backgrounds.¹⁴ It is possible that geographic location could also partly explain differences in sedentary and activity patterns by Hispanic/Latino background. Notably, there are different distributions of Hispanic/Latino background across the field center sites, as reported in prior HCHS/SOL papers.²³ Therefore, it is difficult to determine whether emerging differences are due to geographic site or Hispanic/Latino background. Factors such as acculturation and the neighborhood, home, and school environment may explain differences across geographic locations and/or Hispanic/Latino backgrounds.^{39,40,42,43} Future research is needed to better understand the association of such factors with sedentary patterns.

The lack of differences in sedentary patterns between weekdays and weekends was unexpected, as some evidence suggests that more sedentary time occurs on weekdays among youth.⁴⁴ Although schools are an important setting for providing physical activity,⁴⁵ they could also contribute to high sedentary time. However, this study is limited by lack of information regarding the days and times the child was in school, making it difficult to draw conclusions about why these differences were not found.

As compared with other large population-based studies of youth, youth in the present study had substantially more total sedentary time, similar to what was found in HCHS/SOL adults.⁴⁶ Older youth in the present study spent 74% of their time sedentary (9.4 h/d of sedentary time for the average daily wear time of 12.7 h), whereas in the National Health and Nutrition Examination Survey 2003–2004 study, 12- to 15-year-olds spent 54% of their time sedentary (7.5 h out of 13.9 h/d of wear time).¹² In the National Health and Nutrition Examination Survey 2003–2004, there were minimal differences in sedentary time across racial/ethnic groups for these age groups.¹² Although differences in accelerometer measurement methods could account for some of these disparities, it appears that sedentary time is a particular concern in Hispanic/Latino youth. There are few-to-no other population-based studies of sedentary patterns, so it is difficult to know how sedentary patterns in HCHS/SOL youth compare with others.

Implications for Practice

Due to accumulating evidence on the negative health implications of sedentary time and prolonged sedentary patterns, recommendations are emerging to limit sedentary activity. For example, the American Academy of Pediatrics, Canadian Society for Exercise Physiology, and the Australian Government Department of Health recommend limiting recreational screen time to <1 to 2 hours per day¹⁰ and breaking up long periods of sitting.^{8,9} Although there is no current consensus regarding minutes of total sedentary time and length of bout durations, decreasing population rates of sedentariness could have meaningful impacts on population health.³⁴ Several of the sedentary variables assessed in the present study appeared alarmingly high; for example, 13- to 16-year-olds spent 74% of their time sedentary and 10% of their time in bouts 60 minutes. Early intervention is critical to establish health habits, and early adolescence is a vulnerable time when healthier habits need to be reinforced. Parents can maximize nonsedentary activity opportunities at home by restructuring the home environment to support movement and by restricting long periods of

screen time. For example, parental rules around media usage have been associated with less sedentary time in youth, while parents' sedentary time (ie, modeling), and the number of televisions in the household have been related to more sedentary time.⁴⁷ Schools can also embrace movement in academic lessons by incorporating physical activity in the classroom to assist with a behavior management and as a learning and cognitive enhancement strategy.⁴⁸ Finally, given the accumulation of research and public health efforts to reduce sedentary activity, more surveillance efforts are needed to track population rates of both total sedentary time and sedentary patterns due to the complex role of sedentary activity in health.

Strengths and Limitations

Study strengths include the use of a large population-based sample of Hispanic/Latino youth from 4 areas in the United States, objective measurement of sedentary time, and analyses of sedentary patterns to provide a more nuanced view of sedentary accumulation. Study limitations include uncertainty regarding whether differences in recorded sedentary time across population-based studies of youth are due to methodological differences or true population differences. The missing data could be due to inclusion bias, which may limit generalizability of findings; however, the participants did not differ substantially from those in the full sample. Range restriction in income and place of birth and reduced power in background group comparisons with small sample sizes may have led to the failure to detect true associations. The inclusion of parent education as a covariate in the models examining income may have reduced the changes of identifying significant differences by income group. The nonwear detection algorithm used was developed and tested with the ActiGraph, and its validity is unknown when applied to the Actical.²⁸ This could have led to misclassification of sedentary time as nonwear time or vice versa. In addition, the cross-sectional design of this study does not allow for causal inferences. Future research should examine longitudinal trends in sedentary patterns over time and differences across sociodemographic characteristics.

Conclusions

This study reports increasingly high amounts of total and prolonged sedentary time in Hispanic/Latino youth as they age relative to other groups. Unhealthy sedentary patterns in preadolescence appear to worsen in older adolescence and likely carry into adulthood, contributing to increased morbidity and long-term health concerns.⁴⁹ Strategically focused population-based efforts are warranted to reduce prolonged sedentary time and to increase activity among youth despite the increasing influence of screen time. Improved surveillance efforts and guidelines that recommend specific thresholds for various sedentary pattern measures in youth could encourage improved outcomes.

Acknowledgments

The SOL Youth Study was supported by Grant Number R01HL102130 from the National Heart, Lung, and Blood Institute. The children in SOL Youth are drawn from the study of adults: The HCHS/SOL, which was supported by contracts from the National Heart, Lung, and Blood Institute (NHLBI) to the University of North Carolina (N01-HC65233), University of Miami (N01-HC65234), Albert Einstein College of Medicine (N01-HC65235), Northwestern University (N01-HC65236), and San Diego State University (N01-HC65237). The following Institutes/Centers/Offices contribute to the HCHS/SOL through a transfer of funds to NHLBI: National Center on Minority Health and Health Disparities, the National Institute of Deafness and Other Communications Disorders,

the National Institute of Dental and Craniofacial Research, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute of Neurological Disorders and Stroke, and the Office of Dietary Supplements. Additional support was provided by the Life Course Methodology Core of the New York Regional Center for Diabetes Translation Research (DK111022- 8786). The lead author was supported by a grant from the Center for Children's Healthy Lifestyles and Nutrition at Children's Mercy Kansas City and the University of Kansas Medical Center. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Heart, Lung, and Blood Institute, the National Institutes of Health, or other funders. The authors have no conflicts of interest to declare. The authors report the following financial support: National Heart Lung and Blood Institute, 75N92019D00010 and R01HL102130 (Krista Perreira) and National Heart Lung and Blood Institute (Daniela Sotres-Alvarez). No other financial disclosures were reported by the authors of this paper.

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Table 1

Sociodemographic Characteristics in SOL Youth (Unweighted n = 956)

Characteristics	Unweighted N (weighted %)
Age, y	
8–12	573 (56.8%)
13–16	383 (43.2%)
Sex	
Female	498 (50.9%)
Male	458 (49.1%)
Hispanic/Latino background	
Mexican	477 (51.7%)
Dominican	112 (13.9%)
Puerto Rican	100 (11.2%)
Central American	91 (8.1%)
Cuban	80 (6.7%)
South American	72 (6.3%)
Mixed Hispanic/other	2 (2.1%)
Place of birth (born in US mainland)	729 (78.2%)
Immigrant generation (second generation or more) ^a	721 (79.9%)
Field center	
Bronx	248 (33.3%)
Chicago	278 (19.6%)
Miami	180 (14.7%)
San Diego	250 (32.4%)
Season	
Spring	216 (22.6%)
Summer	339 (35.5%)
Fall	233 (24.4%)
Winter	168 (17.6%)
Parent education level	
< High school diploma or GED	372 (38.5%)
High school diploma/GED	261 (28.4%)
> High school diploma/GED	323 (33.1%)
Annual income	
\$20K	508 (54.3%)
\$21K–\$40K	306 (30.1%)
>\$40K	142 (15.6%)

Abbreviations: GED = General Educational Development; SOL, study of Latinos.

^aImmigrant generation: second generation indicates that parents immigrated, and the child was born in the United States.

Table 2Descriptive Statistics of Sedentary Variables in SOL Youth^a (unweighted n = 956)

Sedentary variable	Weighted
	Mean (SE)
Wear time, min/d	761.6 (4.4)
Sedentary and activity variables	
Total sedentary time, % of wear time	67.3 (0.4)
Time in bouts lasting 1–9 min, % of wear time	21.8 (0.2)
Time in bouts lasting 10–29 min, % of wear time	24.2 (0.2)
Time in bouts lasting 30–59 min, % of wear time	14.1 (0.3)
Time in bouts lasting ≥ 60 min, % of wear time	7.2 (0.3)
Median bout duration, min	3.5 (0.0)
Usual bout duration, min	15.9 (0.3)
Alpha, unitless	1.8 (0.0)
Number of breaks/day	70.8 (0.7)
Fragmentation index, breaks/h of sedentary time	8.9 (0.1)
Period, min	3.0 (0.0)

Abbreviation: SOL, study of Latinos.

^aTime in bouts lasting 1 to 9 minutes, time in bouts lasting 10 to 29 minutes, time in bouts lasting 30 to 59 minutes, and time in bout lasting ≥ 60 minutes represented the percentage of accelerometer wear time spent in sedentary bouts of these respective lengths. Median bout duration: median duration of all sedentary bouts. Usual bout duration: bout duration at which 50% of all sedentary time was accumulated; greater values equate to more prolonged bouts of sedentary time.

Alpha: the relative proportion of shorter to longer sedentary bouts, with greater values indicating a proportionally greater number of short bouts.

Number of breaks/day: number of times per day participant transitioned from sedentary time to nonsedentary time; sit-stand transitions.

Fragmentation index: break rate, calculated as the total number of sedentary breaks divided by total hours of sedentary time.

Period: average duration between sedentary bouts.

Table 3 Adjusted Means of Sedentary Variables by Sex, Age, Household Income, and Field Center^a

Sedentary variable	Sex		Age				Household income				Field center						
	Female (n = 498)	Male (n = 458)	8–12 yo (n = 573)	13–16 yo (n = 383)	<\$20K (n = 508)	\$21K–\$40K (n = 306)	>\$40K (n = 142)	Bronx (n = 248)	Chicago (n = 278)	Miami (n = 180)	San Diego (n = 250)	P	F (df)	P			
	F (df)	F (df)	P	F (df)	P	F (df)	F (df)	F (df)	F (df)	F (df)	F (df)	F (df)	F (df)	F (df)			
Total sedentary time, %	67.1 (0.8)	66.1 (0.8)	2.3 (1, 341)	.13	71.7 (0.8)	61.5 (0.8)	4	218.5 (1, 341)	<.01	65.7 (0.8)	66.8 (0.9)	67.3 (1.0)	1.7 (2, 340)	.19	3	2.6 (3, 339)	.04
Time in bouts lasting 1–9 min, % of wear time	21.8 (0.3)	20.9 (0.3)	6.8 (1341)	.00	18.9 (0.4)	23.6 (0.3)	9	175.7 (1341)	<.01	21.8 (0.3)	21.3 (0.4)	20.6 (0.5)	1.8 (2340)	.16	4	2.6 (3339)	.05
Time in bouts lasting 10–29 min, % of wear time	24.9 (0.6)	24.4 (0.5)	1.5 (1341)	.22	25.9 (0.5)	23.4 (0.6)	2	34.9 (1341)	<.01	23.8 (0.5)	24.6 (0.6)	25.5 (0.7)	3.4 (2340)	.03	4	0.6 (3339)	.59
Time in bouts lasting 30–59 min, % of wear time	13.8 (0.6)	13.9 (0.5)	.08 (1341)	.77	17.7 (0.5)	10.2 (0.5)	9	199.9 (1341)	<.01	13.9 (0.5)	13.9 (0.1)	13.9 (0.8)	0.0 (2340)	.99	5	4.4 (3339)	.00
Time in bouts lasting 60 min, % of wear time	6.5 (0.5)	6.9 (0.5)	0.5 (1, 341)	.48	9.2 (0.6)	4.3 (0.5)	3	75.4 (1, 341)	<.01	6.3 (0.5)	6.9 (0.5)	7.0 (0.9)	0.6 (2340)	.54	3	0.9 (3339)	.43
Usual bout duration, min	15.8 (0.5)	16.1 (0.4)	0.7 (1, 341)	.41	19.1 (0.5)	12.8 (0.4)	8	174.2 (1, 341)	<.01	15.2 (0.4)	15.9 (0.4)	16.8 (0.9)	1.6 (2, 340)	.20	9	2.9 (3, 339)	.03
Median bout duration, min	3.6 (0.2)	3.5 (0.1)	.01 (1341)	.92	4.0 (0.1)	3.1 (0.2)	1	57.2 (1341)	<.01	3.3 (0.1)	3.4 (0.1)	3.9 (0.4)	1.2 (2340)	.31	1	2.8 (3339)	.04
Alpha, unitless	1.82 (0.1)	1.81 (0.1)	2.2 (1, 341)	.13	1.74 (0.1)	1.89 (0.1)	4	207.4 (1, 341)	<.01	1.84 (0.1)	1.82 (0.1)	1.80 (0.2)	3.76 (2, 340)	.02	4	2.64 (3, 339)	.04
Number of breaks/day	71.2 (0.9)	68.4 (0.7)	10.9 (1, 341)	.00	63.7 (0.9)	75.9 (0.7)	1	197.5 (1, 341)	<.01	71.3 (0.8)	69.6 (0.9)	68.6 (1.3)	2.3 (2, 340)	.10	3	1.9 (3, 339)	.13
Fragmentation index, breaks/hour of sedentary time	9.0 (0.2)	8.7 (0.2)	1.9 (1, 341)	.17	7.4 (0.2)	10.3 (0.2)	3	239.8 (1, 341)	<.01	9.1 (0.2)	8.8 (0.2)	8.6 (0.3)	2.2 (2, 340)	.11	7	2.4 (3, 339)	.06

Sedentary variable	Sex		Age		Household income				Field center					
	Female (n = 498)	Male (n = 458)	8-12 yo (n = 573)	13-16 yo (n = 383)	< \$20K (n = 508)	\$21K- \$40K (n = 306)	> \$40K (n = 142)	P	Chicago (n = 278)	Bronx (n = 248)	Miami (n = 180)	San Diego (n = 250)	F (df)	P
Period, min	3.1 (0.1)	3.3 (.1)	3.5 (.1)	2.9 (0.1)	3.2 (0.1)	3.3 (0.1)	3.2 (0.1)	<.01	3.2 (0.1)	3.1 (0.1)	3.4 (0.2)	3.2 (0.1)	.909 (3, 339)	.43 7

^aSex, age, Hispanic/Latino background, place of birth, household income, field center, parent education, wear time, number of weekdays, number of weekend days were included as covariates.

Significant *P* values are bold. All sample sizes are unweighted

Table 4
Adjusted Means of Sedentary Variables by Hispanic/Latino Background and Place of Birth^a

Sedentary variable	Mean (SE)											
	Hispanic/Latino background						Place of birth					
	Mexican (unweighted n = 477)	Dominican (unweighted n = 112)	Puerto Rican (unweighted n = 100)	Cuban (unweighted n = 80)	Central American (unweighted n = 91)	South American (unweighted n = 72)	US born (unweighted n = 729)	Non-US Born (unweighted n = 227)	F (df)	P	F (df)	P
Total sedentary time, %	68.5 (0.9)	68.2 (1.4)	67.4 (1.4)	70.1 (2.2)	70.9 (1.2)	69.1 (1.7)	66.2 (0.8)	67.0 (0.9)	2.3 (7335)	.026	0.9 (1341)	.354
Time in bouts lasting 1–9 min, % of wear time	20.5 (0.5)	21.5 (0.7)	22.4 (0.6)	21.6 (0.9)	20.6 (0.8)	20.0 (0.7)	21.8 (0.3)	20.8 (0.4)	4.1 (7335)	<.001	5.0 (1341)	.026
Time in bouts lasting 10–29 min, % of wear time	24.5 (0.5)	23.6 (0.8)	25.2 (0.9)	25.4 (0.1)	27.0 (0.7)	26.4 (0.1)	24.4 (0.5)	24.9 (0.6)	2.2 (7335)	.028	1.0 (1341)	.326
Time in bouts lasting 30–59 min, % of wear time	15.9 (0.7)	14.9 (1.1)	13.5 (1.0)	14.2 (1.4)	15.8 (1.1)	15.1 (1.1)	13.2 (0.4)	14.7 (0.7)	4.3 (7335)	<.001	4.2 (1341)	.042
Time in bouts lasting 60 min, % of wear time	7.6 (0.7)	8.1 (1.1)	6.4 (0.8)	9.0 (1.2)	7.4 (1.0)	7.6 (1.1)	6.8 (0.4)	6.5 (0.6)	5.0 (7335)	<.001	0.3 (1341)	.571
Usual bout duration, min	17.1 (0.6)	17.4 (1.1)	15.2 (0.7)	17.1 (1.2)	17.4 (1.1)	17.0 (0.9)	15.7 (0.4)	16.2 (0.5)	5.3 (7335)	<.001	0.9 (1341)	.334
Median bout duration, min	3.6 (0.1)	4.1 (0.5)	3.4 (0.2)	3.9 (0.3)	4.0 (0.3)	3.8 (0.2)	3.7 (0.2)	3.8 (0.1)	2.9 (7335)	.006	.02 (1341)	.896
Alpha, unitless	1.79 (0.1)	1.81 (0.2)	1.83 (0.2)	1.77 (0.4)	1.78 (0.4)	1.79 (0.3)	1.82 (0.1)	1.81 (0.1)	2.16 (7335)	.043	0.6 (1341)	.440
Number of breaks/day	67.5 (1.3)	69.8 (1.9)	72.5 (1.6)	69.6 (2.5)	68.7 (2.1)	67.6 (1.8)	70.6 (0.7)	69.0 (1.0)	2.8 (7335)	.007	2.0 (1341)	.153
Fragmentation index, breaks/hour of sedentary time	8.3 (0.3)	8.7 (0.4)	9.0 (0.4)	8.2 (0.7)	8.1 (0.4)	8.4 (0.5)	8.9 (0.2)	8.7 (0.2)	2.7 (7335)	.009	1.2 (1341)	.266
Period, min	3.1 (0.1)	3.0 (0.1)	2.9 (0.1)	2.8 (0.2)	2.7 (0.1)	3.0 (0.2)	3.0 (0.1)	2.9 (0.1)	2.8 (7335)	.009	0.1 (1341)	.753

^aSex, age, Hispanic/Latino background, place of birth, household income, field center, parent education, wear time, number of weekdays, and number of weekend days were included as covariates.

Significant *P* values are bold.