**Associations between physical activity, sedentary behavior and weight status with sexuality outcomes: Analyses from National Health and Nutrition Examination Survey**

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**Abstract**

**Background**: Physical activity is likely to be associated with sexual activity. However, to date, there is no literature on the relationship between overweight/obesity and sexual activity outcomes.

**Aim**: Thus, the present study assessed the associations between physical activity, sedentary behavior, and weight status with sexual activity and number of previous sexual partners in a representative sample of US adults.

**Methods/Outcomes**: Data on leisure time physical activity, total sitting time, weight status, sexual behavior outcomes, and other characteristics were extracted from the National Health and Nutrition Study (NHANES) cycle 2007 to 2016. Logistic regression models were used to evaluate associations between body mass index, leisure time physical activity, and total sitting time with past-year sexual activity and number of sexual partners.

**Results**: In a sample of 7,049 men (mean age: 38.3 ± 0.3 years) and 7,005 women (mean age: 38.7 ± 0.2 years) being overweight was associated with higher odds of frequent sexual activity (OR=1.5, 95% CI=1.2-1.7) among men, but lower odds among women (OR=0.8, 95% CI: 0.6-0.9). Sufficient physical activity was associated with higher odds of frequent sexual activity among both men (OR=1.3, 95% CI=1.1-1.5) and women (OR=1.2, 95% CI=1.0-1.4). In those living alone, being obese was associated with lower odds of having at least one sexual partner for men (OR=0.7, 95% CI=0.5-0.9) and women (OR=0.6, 95% CI=0.4-0.8). Being sufficiently physically active was associated with higher odds of having at least one sexual partner only in men (OR=1.6, 95% CI=1.2-2.2).

**Clinical Implications**: Healthcare professionals need to be made aware of these results, as they could be used to plan tailored interventions.

**Strengths & Limitations:** Strengths include the large, representative sample of US adults and objective measures of anthropometry. Limitations include the cross-sectional design of the study and that all variables on sexual history were self-reported.

**Conclusions**: The present study identifies novel modifiable behavioral and biological antecedents of sexuality outcomes.

**Key words**: weight status; sexual activity, physical activity, sedentary behavior

**Introduction**

To date, the majority of the literature on sexual activity, has focused on its negative aspects, such as the spread of sexually transmitted infections (STIs), including HIV.1-3 However, an emerging body of research suggests that frequent sexual activity is beneficial for physical and mental health and a normal aspect of human functioning.4 The largest study thus far to investigate the relationship between sexual activity and physical health included 1,046 men and 1,158 women (aged 57-85) residing in the US, with a five-year follow-up. Results indicated that more frequent and high-quality sex protected against cardiovascular events in later life.5 Frequency of sexual intercourse has also been shown to be associated with reduced risk of fatal coronary events, as well as prostate and breast cancer.6-8 In addition, sexual activity has been shown to be protective against mental health complications.9 In a study of 133 older adults (mean age 74 years), both the frequency and self-rated importance of sexual behaviors, respectively, were moderately positively correlated (*r* = 0.52 and 0.47, both *p*<0.001) with quality of life.10 In another study with a representative sample of 2,810 adults in Sweden, the frequency of sexual intercourse was positively associated with sexual satisfaction, health, and wellbeing.11 Despite these positive health benefits of engaging in sexual activity, the prevalence of sexual activity has consistently been shown to decline with age.12, 13

Physical activity (PA) is likely to be associated with sexual activity. Regular and sustained participation in PA has been shown to be associated with higher levels of self-efficacy and physical functioning in adults.14 At the opposite end of the energy expenditure continuum is sedentary behavior. Sedentary behavior is defined as any waking behavior characterized by an energy expenditure ≤1.5 metabolic equivalents (METs) while in a sitting, reclining, or lying posture.15 Importantly, excessive sedentary time has been shown to have a detrimental influence on physical and mental health independent of physical activity.16, 17 It is thus reasonable to assume that excessive sedentary time may be associated with less sexual activity.

To date, there is limited literature on the relationship between overweight/obesity and sexual activity outcomes and the literature that does exist has predominantly focused on erectile dysfunction 18-24. It is plausible to assume that those who are overweight or obese will participate in less frequent sexual activity owing to suppression of sex hormones especially in men25, while in women this association is more complex with various results reported26-28. In addition, being overweight/obese is strongly associated with lower indices of positive body image, which in turn has been associated with avoidant responses to sex.29

In addition to the positive influence of sexual activity on physical and mental health, there is an emerging body of literature that has investigated the detrimental impact a high number of previous sexual partners may have on health. Studies have shown that a greater number of sexual partners is associated with greater risk of contracting STIs, which can impose long-term consequences, such as greater risk of specific cancers.30, 31 Identifying those most likely to have multiple sexual partners would allow for targeted interventions to prevent the spread of STIs.

The aim of the present study was therefore to investigate associations between physical activity, sedentary behavior, and weight status with sexual activity and number of sexual partners in the last year in a large, representative sample of US adults.

**Material and methods**

Study Population

The National Health and Nutrition Examination Survey (NHANES) was designed to provide cross-sectional estimates on the prevalence of health, nutrition, and potential risk factors among the civilian non-institutionalized US population up to 85 years of age.32 In brief, NHANES surveys a nationally representative complex, stratified, multistage, probability clustered sample of about 5,000 participants each cycle in 15 counties across the US. Survey participants were asked to attend physical examination in a mobile examination center. The NHANES obtained approval from the National Center for Health Statistics Research Ethics Review Board and participants provided written informed consent. We extracted and aggregated data on weight status, leisure time physical activity, total sitting time, sexual behavior outcomes, and other characteristics from NHANES from cycle 2007-2008 to 2015-2016. We restricted our study sample to men and women aged 20 to 59 years because of the upper age limit of the sexual behavior questions used in present analyses.

Sexual behavior

Lifetime and current sexual behavior was self-reported during the Mobile Examination Center (MEC) interview. Two metrics on sexual behavior were derived: frequency of past-year sexual activity and number of sex partners in the past year. Both men and women were asked “In the past year, about how many times have you had [vaginal or anal] sex?” with response options of 0: “never”, 1: “once”, 2: “2-11 times”, 3: “12-51 times”, 4: “52-103 times”, 5: “104-364 times”, and 6: “365 times or more”. We aggregated the responses into a binary variable: < once a week (0-3) vs. ≥ once a week (4-6). Once a week proxies the average frequency of sex activity in American adults,33 and has been previously associated with health benefits.34

Number of sexual partner last year was derived for men and women, respectively. We summarized the total number of sex partners (same or opposite sex) in the past year for each participant who reported having (performing or receiving) any kind of sex. Due to the large inter-individual variation in the number of sex partners, we used a dichotomized variable to indicate no (none) vs. any (≥ one) sexual partners in the past year.35

Body mass index (BMI)

Weight and height were measured in a MEC or in the participant’s home at the time of physical examination. The measurements followed standard procedures and were carried out by trained technicians using standardized equipment. BMI was calculated as weight in kg/(height in meters)2. We categorized study participants into BMI categories: underweight (<18.5kg/m2), normal weight (18.5-24.9 kg/m2), overweight (25.0 – 29.9 kg/m2), and obese (≥30.0 kg/m2).36 For analytic purposes, we excluded underweight participants due to potential underlying health conditions.

Self-reported leisure-time physical activity (LTPA)

Participants self-reported their activity patterns using questions based on the Global Physical Activity Questionnaire (GPAQ).37 Levels of LTPA were calculated as the minutes per week that participants reported participating in moderate-to-vigorous-intensity physical activity. Participants reported the frequency and duration of physical activity in a typical week, at moderate and vigorous intensities, respectively. We summarized the total number of minutes for physical activity for each intensity, where the number of minutes spent in vigorous-intensity physical activity were doubled and added to the number of minutes of moderate-intensity physical activity to be approximately equivalent the metabolic equivalent of task value.38 Participants were classified as inactive (zero min/week of moderate-to-vigorous physical activity [MVPA]), insufficiently active (<150 min/week MVPA), and sufficiently active (≥150 min/week MVPA) based on physical activity guidelines.39

Self-reported total sitting time

Participants self-reported “(In a typical week,) how much time (minutes) do you usually spend sitting (or reclining) on a typical day? (including time spent sitting at a desk, sitting with friends, traveling in a car or bus, or train, reading, playing cards, watching television, or using a computer)”. Participants’ responses were converted to hours per day40 and categorized as <4 hours/day, 4-<6 hours/day, 6-<8 hours/day, and 8-12 hours/day. Responses higher than 720 min/day (2/3 of waking hours) were considered to be implausible values and excluded.41 Although this specific question has not been previously validated, it is similar to the sitting question in the International Physical Activity Questionnaire (IPAQ) short-form: “During the last 7 days, how much time did you usually spend sitting on a week-day/weekend day?”. The IPAQ short-form sitting question was developed as a separate indicator from the physical activity score, and has shown high repeatability (test-retest Spearman’s *rho* > 0.71) and adequate validity (criterion validity Spearman’s *rho* > 0.45) against CSA accelerometer (a criterion measure for free-living physical activity) in US adult samples.42

Socio-demographic characteristics

Data on age, sex, and a range of characteristics were extracted. Marital status was summarized into two groups: living with someone (married or living with partner) and living alone (widowed, divorced, separated, or never married). Based on self-reported race and ethnicity, participants were classified into one of the four racial/ethnic groups: Non-Hispanic White, Non-Hispanic Black, Hispanic, and other. Participants’ household annual income and education levels were classified into three groups: <$25000, $25000-74999 and ≥$75000, and less than high school, high school, and above high school, respectively. Finally, we classified participants into three smoking groups: never smokers (did not smoke 100 cigarettes in lifetime and do not smoke now), former smokers (smoked 100 cigarettes in lifetime and do not smoke now), and current smokers (smoked 100 cigarettes in lifetime and smoke now). We excluded those who were living with physical function limitation (defined as difficulty walking for a quarter mile or walking up ten steps).

Statistical Analysis

Survey analysis procedures were used to account for the sample weights, stratification, and clustering of the complex sampling design to ensure nationally representative estimates. Descriptive characteristics were analyzed separately in men and women due to the documented gender difference in sexual activity.13, 43. We summarized weighted means and standard errors for age and weighted proportions for categorical variables by frequency of past-year sexual activity (< once a week vs. ≥ once a week).

Age-adjusted prevalence of frequent past-year sexual activity (≥ once a week) in the reference group (normal weight, inactive, sitting <4 hours) was estimated among men and women, respectively. Gender-specific multiple logistic models were carried out to estimate the odds of having sex at least once a week in the past year in relation to weight status, physical activity, and sitting, in the overall sample and stratified by living condition (with someone vs. alone). Multivariable models were adjusted for age, race/ethnicity, household income, marital status, education level, smoking status, and mutually for weight status, physical activity, and sitting. Finally, we restricted our sample to those who lived alone and estimated the odds of having at least one sexual partner in the past year using multivariable logistic regressions. All statistical significance was set at *p*<0.05. All statistical analyses were performed using STATA version 14.0 (STATA Corp., Texas, USA).

**Results**

There were 7,049 men (mean age: 38.3 ± 0.3 years) and 7,005 women (mean age: 38.7 ± 0.2 years). The majority of the study sample were married or living with a partner (men: 66.7%, women: 60.0%), Non-Hispanic White (men: 63.6%, women: 63.1%), and had at least some college education (men: 70.1%, women: 71.9%).

Tables [2](http://onlinelibrary.wiley.com/doi/10.1002/oby.22011/full#oby22011-tbl-0002) to 4 summarize the age-adjusted prevalence of frequent past-year sexual activity (≥ once a week) in the reference group (normal weight, physical inactive, sitting <4 hours), and multivariable-adjusted odds ratios of frequent past-year sexual activity in relation to weight status, physical activity, and sitting. Overall, 36.1% of men and 35.9% of women reported frequent past-year sexual activity. There was no apparent association between graded BMI and frequency of past year sexual activity in men or women (Table 2). However, being overweight was associated with higher odds of frequent sexual activity in the past year in men (OR=1.5, 95% CI: 1.2-1.7), irrespective of whether they reported living with someone (OR=1.3, 95% CI: 1.1-1.6) or living alone (OR=1.7, 95% CI: 1.3-2.3). Further, being obese was associated with higher odds of frequent sexual activity in the past year (OR=1.4, 95% CI: 1.0-2.0) only among men who lived alone. In contrast, being overweight in women was associated with lower odds of frequent sexual activity in the past year (OR=0.8, 95% CI: 0.6 to 0.9), particularly among those living with someone (OR=0.7, 95% CI: 0.6-0.9; Table 2).

Being sufficiently physically active was associated with higher odds of frequent sexual activity in the past year in men (OR=1.3, 95% CI: 1.1-1.5, *p* for trend = 0.001), but this appeared to be driven by those who were living with someone (OR=1.4, 95% CI: 1.1-1.7, *p* for trend = 0.001), while no association was seen among men living alone (OR=0.9, 95% CI: 0.6-1.4, *p* for trend = 0.490; Table 3). Among women, being both insufficiently active (OR=1.2, 95% CI: 1.0-1.5) and sufficiently active (OR=1.2, 95% CI: 1.0-1.4) were associated with more frequent sexual activity relative to being inactive, particularly among those who were living with someone (*p* for trend = 0.053). We observed no association between total sitting time and frequency of sexual activity in the past year either men or women (Table 4).

When restricting the analyses to those who were living alone, 83.3% of male and 84.3% of female participants reported having at least one sexual partner in the past year. A negative association emerged between weight status and odds of having a sexual partner in the past year (Table 2). Furthermore, in both men and women, higher BMI was associated with lower odds of having at least one sexual partner in the past year (men*:* *p* for trend = 0.019, women*:* *p* for trend < 0.001). In addition, being physical active was associated with higher odds or having at least one sexual partner in the past year, but only in men *(p* for trend = 0.003; Table 3). Meanwhile, spending more time sitting was associated with lower odds of having at least one sexual partner in the past year in women *(p* for trend = 0.019), but not in men (Table 4).

**Discussion**

In this large, representative sample of US adults, we found divergent associations between weight status and frequency of past year sexual activity in our sample. Among men, being overweight was associated with higher odds of frequent sexual activity in the past year in men. In contrast, being overweight was associated with lower odds of frequent sexual activity in the past year in women. Being physically active was associated with higher odds of frequent sexual activity (≥ once a week) in the past year in men and women living with someone. No associations were found between sedentary time and frequency of sexual activity. In men, higher physical activity levels were associated with more sexual partners, while in women more time spent sitting was also associated with reporting more sexual partners in the past year.

The finding that having a greater BMI is associated with higher odds of frequent sexual activity in the past year in men is interesting. A plausible explanation for this observed association may be due to weight gain in stable cohabiting relationships. For example, it was found in a longitudinal cohort of working adults (1,209 men and 1,319 women) that marriage was associated with a significant two-year weight gain.44 Other studies have reported similar findings.45, 46 Additionally, some studies reported that higher BMI in men is associated with improved positive body image, which in turn is associated with more liberal sexual activities.29, 47 It may therefore be the case that, although in general having an overweight BMI is detrimental to health, it is also associated with greater sexual activity in men and thus to the related physical and mental health benefits.

Interestingly, a higher BMI was associated with lower odds of having more than one sexual partner in the past year for both men and women. This finding is in contrast with results of a study of over 60,000 participants, which showed that overweight men tend to report more sexual partners.48 Furthermore, there was a generally low variability in reported sexual partners for women of different BMIs due to differences in clinical and social definitions of “overweight”.48

Among men and women living with someone, being physically active was associated with more frequent sexual activity. It is likely that those adults who are physically active have better physical function, more positive body image, body and functionality appreciation and higher levels of self-efficacy for performing physical tasks than those who are inactive,14 which may lead to increased frequency of sexual activity mediated by individual differences in sexual confidence and sexual esteem.49, 50 The reason why this association was only found among those cohabiting is elusive, as it is plausible to have a stable relationship and not cohabit, and further research is required. No associations were found between sedentary time and sexual activity, which leads to a postulation that an increase in physical activity and not a reduction in sitting time may be adequate to increase sexual activity in US adults. However, more longitudinal research should be done to confirm the causal effect.

Those with a higher BMI and living alone had a lower odds of having more than one sexual partner in the previous year, which is similar to the findings of other studies.51 A plausible underlying mechanism for this association may be predicated on the association between higher BMIs and lower indices of positive body image and self-rated attractiveness, which is associated with more avoidant sexual behaviors.52-54 The finding that, in men, those with higher levels of physical activity had a greater number of sexual partners in the previous years was expected. As previously stated, it is likely that those adults who are physically active have better physical function and higher levels of self-efficacy for performing physical tasks than those who are inactive,14 which may lead to an increased number of sexual partners. Although we found no association between being physical active and the odds of a greater number of sexual partners in women, sedentary women reported a lower number of sexual partners. The reason for this association is elusive and further research is required to understand this association.

Strengths of this study include the large, representative sample of US adults and objective measures of anthropometry. However, the findings must be interpreted in light of the study’s limitations. Firstly, analyses were cross-sectional and it is therefore not possible to determine the causal direction of the associations found. Another potential limitation with the cross-sectional design is its inability for precise effect size estimation. To better understand the public health implication of associations identified in our study, well-designed prospective investigations are required to underlie the sexual outcome risk profiles in relation to lifestyle factors examined. Furthermore, our results might not be generalizable to the non-heterosexual population owning to a very small proportion in our study population (5.9% men, 8.5% women). All variables on sexual history were self-reported and required recall of the past year, introducing potential for social desirability and recall bias. Finally, we cannot rule out residual confounding, for example, we were unable to control for ED conditions, ED drug use such as PDE5i, or hypogonadism and whether participants had or do engage in transactional sexual activity.

**Conclusion**

In conclusion, the present study has identified that higher levels of physical activity in males and females, and being overweight was associated with more frequent sexual activity in men, but lower frequency in women. More frequent past-year sexual activity was also seen in men who had higher BMIs. As a high proportion of the male population is overweight or obese, healthcare professionals ought to actively provide sexual health counselling and not be tempted to assume low sexual activity in this group. As women with a normal BMIs and physically active men had higher odds of having sexual partners in the previous year, these populations may be at higher risk of STIs and subsequent health complications. Given apparent differences in gender and BMI, as well as surrounding social implications, healthcare professionals need to be aware of these results, as it may be useful for planning tactful and tailored interventions.

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| Table 1. Sociodemographic characteristics of men and women aged 20-59 years in the NHANES (2007-2016) |
|   |   | Sexual activity in men |   |  Sexual activity in women |
|  |  | < once a week | ≥ once a week |  | < once a week | ≥ once a week |
|   |   | (*n*=4521) | (*n*=2528) |   | (*n*=4563) | (*n*=2442) |
| Age (years) | mean (se) | 40.0 (0.3) | 36.2 (0.3) |  | 39.8 (0.3) | 35.5 (0.4) |
| Marital status |  |  |  |  |  |  |
| Living with someone | % | 34.6 | 24.4 |  | 33.7 | 25.1 |
| Living alone | % | 65.4 | 75.6 |  | 66.3 | 74.9 |
| Race |  |  |  |  |  |  |
| Non-Hispanic White | % | 65.6 | 64.2 |  | 63.6 | 65.7 |
| Non-Hispanic Black | % | 11.9 | 9.8 |  | 14.3 | 9.9 |
| Hispanic  | % | 15.5 | 19.2 |  | 14.7 | 17.5 |
| Other | % | 7.0 | 6.8 |  | 7.4 | 6.9 |
| Household income (annual) |  |  |  |  |  |  |
| ≤ $25000 | % | 16.7 | 15.6 |  | 12.9 | 18.9 |
| $25000-74999 | % | 38.7 | 41.1 |  | 39.1 | 41.5 |
| ≥$75000 | % | 44.6 | 43.3 |  | 42.0 | 39.6 |
| Education |  |  |  |  |  |  |
| Less than high school | % | 15.4 | 14.2 |  | 13.2 | 12.0 |
| High school | % | 22.4 | 23.3 |  | 19.0 | 18.7 |
| Some college and above | % | 62.2 | 62.5 |  | 67.8 | 69.3 |
| Smoking |  |  |  |  |  |  |
| Never smoker | % | 52.4 | 52.5 |  | 63.4 | 59.5 |
| Former smoker | % | 21.2 | 22.5 |  | 16.4 | 16.7 |
| Current smoker | % | 26.4 | 25.0 |  | 20.2 | 23.8 |
| Body mass index (kg/m2) |  |  |  |  |  |  |
| 18.5 – 24.9 | % | 28.8 | 25.2 |  | 33.8 | 39.2 |
| 25.0 – 29.9  | % | 36.6 | 40.9 |  | 28.9 | 25.4 |
| ≥ 30 | % | 34.6 | 33.9 |  | 37.3 | 35.4 |
| Leisure time physical activitya |  |  |  |  |  |  |
| Inactive | % | 40.4 | 35.0 |  | 44.5 | 40.4 |
| Insufficiently active | % | 14.8 | 14.2 |  | 17.6 | 18.7 |
| Sufficiently active | % | 44.8 | 50.8 |  | 37.9 | 40.9 |
| Total sitting time |  |  |  |  |  |  |
| < 4 hours/day | % | 24.5 | 26.3 |  | 25.7 | 26.2 |
| 4 - <6 hours/day | % | 24.0 | 25.4 |  | 22.6 | 25.3 |
| 6 - <8 hours/day | % | 16.7 | 15.6 |  | 15.6 | 15.2 |
| ≥ 8 hours/day | % | 34.8 | 32.7 |   | 36.1 | 33.3 |

se=standard error

a Participants were classified as inactive (zero min/week MVPA), insufficiently active (<150 min/week MVPA), and sufficiently active (≥150 min/week MVPA) based on physical activity guidelines.39

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| Table 2 Association of BMI with frequency of sexual activity and sexual partners |
|   | Age-adjusted prevalence | Multivariable adjusted OR(95% CI)a | *p* for trend |
|  | 18.5 – 24.9 kg/m2 | 25.0 – 29.9 kg/m2 | ≥ 30 kg/m2 |  |
| **Frequency of past year sexual activity (≥ once/week)** |  |  |  |  |  |  |  |
| Men | 30.9 | **1.5** | **(1.2 to** | **1.7)** | **1.2** | **(1.0 to** | **1.5)** | 0.062 |
| Living with someone | 37.9 | **1.3** | **(1.1 to** | **1.6)** | 1.1 | (0.9 to | 1.4) | 0.743 |
| Living alone | 21.4 | **1.7** | **(1.3 to** | **2.3)** | **1.4** | **(1.0 to** | **2.0)** | **0.019** |
| Women | 39.1 | **0.8** | **(0.6 to** | **0.9)** | 0.9 | (0.8 to | 1.1) | 0.345 |
| Living with someone | 42.7 | **0.7** | **(0.6 to** | **0.9)** | 0.9 | (0.8 to | 1.2) | 0.538 |
| Living alone | 31.1 | 0.9 | (0.6 to | 1.2) | 0.9 | (0.7 to | 1.2) | 0.459 |
| **≥ one sexual partner in the past year** |  |  |  |  |  |  |  |  |
| Men living alone | 76.6 | **0.7** | **(0.5 to** | **1.0)** | **0.7** | **(0.5 to** | **0.9)** | **0.019** |
| Women living alone | 75.1 | 0.9 | (0.6 to | 1.2) | **0.6** | **(0.4 to** | **0.8)** | **0.000** |

OR= odds ratio, 95% CI= 95% confidence interval. Note: Boldface indicates statistical significance (p<0.05)

aMultivariable adjustment included age (continuous), marital status (living with someone, living alone in overall sample only), race (non-Hispanic white, non-Hispanic black, Hispanic), household income (≤ $25000, $25000-74999, ≥$75000), education level (less than high school, high school, some college and above), smoking status (never smoker, former smoker, current smoker), physical activity (inactive, insufficiently active, sufficiently active) and sedentary behavior (total sitting <4 hours/day, 4-<6 hours/day, 6-<8 hours/day, ≥ 8 hours/day).

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| Table 3 Association of physical activity with frequency of sexual activity and sexual partners |
|   | Age-adjusted prevalence (%) | Multivariable adjusted OR (95% CI)a | *p* for trend |
|  | Inactiveb | Insufficiently Activeb | Sufficiently Activeb |  |
| **Frequency of past year sexual activity (≥ once/week)** |  |  |  |  |  |  |  |
| Men | 26.6 | 1.1 | (0.8 to | 1.4) | **1.3** | **(1.1 to** | **1.5)** | **0.001** |
| Living with someone | 29.3 | 1.2 | (0.9 to | 1.5) | **1.4** | **(1.1 to** | **1.7)** | **0.001** |
| Living alone | 19.7 | 0.9 | (0.6 to | 1.4) | 1.1 | (0.8 to | 1.5) | 0.490 |
| Women | 26.5 | **1.2** | **(1.0 to** | **1.5)** | **1.2** | **(1.0 to** | **1.4)** | 0.072 |
| Living with someone | 30.0 | 1.2 | (0.9 to | 1.5) | **1.2** | **(1.0 to** | **1.5)** | 0.053 |
| Living alone | 19.8 | 1.2 | (0.9 to | 1.8) | 1.1 | (0.8 to | 1.4) | 0.682 |
| **≥ one sexual partner in the past year** |  |  |  |  |  |  |  |  |
| Men living alone | 51.7 | 0.8 | (0.5 to | 1.3) | **1.6** | **(1.2 to** | **2.2)** | **0.003** |
| Women living alone | 52.2 | 1.0 | (0.8 to | 1.5) | 1.2 | (0.9 to | 1.5) | 0.234 |

OR= odds ratio, 95% CI= 95% confidence interval. Note: Boldface indicates statistical significance (p<0.05)

aMultivariable adjustment included age (continuous), marital status (living with someone, living alone in overall sample only), race (non-Hispanic white, non-Hispanic black, Hispanic), body mass index (18.5-24.9 kg/m2, 25.0-29.9 kg/m2, ≥ 30 kg/m2), household income (≤ $25000, $25000-74999, ≥$75000), education level (less than high school, high school, some college and above), smoking status (never smoker, former smoker, current smoker), and sedentary behavior (total sitting <4 hours/day, 4-<6 hours/day, 6-<8 hours/day, ≥ 8 hours/day).

b Participants were classified as inactive (zero min/week MVPA), insufficiently active (<150 min/week MVPA), and sufficiently active (≥150 min/week MVPA) based on physical activity guidelines.39

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| Table 4 Association of total sitting time with frequency of sexual activity and sexual partners |  |
|   | Age-adjusted prevalence (%) | Multivariable adjusted OR (95% CI)a | *p* for trend |
|  | <4 hours | 4- <6 hours | 6- <8 hours | 8+ hours |  |
| **Frequency of past year sexual activity (≥ once/week)** |  |  |  |  |  |  |  |  |  |  |
| Men | 28.8 | 1.0 | (0.8 to | 1.2) | 0.9 | (0.8 to | 1.1) | 0.9 | (0.8 to | 1.1) | 0.324 |
| Living with someone | 33.3 | 1.0 | (0.8 to | 1.2) | 1.0 | (0.8 to | 1.3) | 0.9 | (0.7 to | 1.1) | 0.360 |
| Living alone | 19.8 | 1.2 | (0.8 to | 1.7) | 0.8 | (0.5 to | 1.2) | 1.0 | (0.7 to | 1.4) | 0.650 |
| Women | 28.2 | 1.1 | (0.9 to | 1.4) | 1.0 | (0.8 to | 1.2) | 1.0 | (0.8 to | 1.2) | 0.414 |
| Living with someone | 30.9 | 1.1 | (0.9 to | 1.5) | 0.9 | (0.7 to | 1.2) | 1.0 | (0.8 to | 1.2) | 0.416 |
| Living alone | 21.1 | 1.1 | (0.8 to | 1.5) | 1.1 | (0.8 to | 1.7) | 0.9 | (0.6 to | 1.4) | 0.713 |
| **≥ one sexual partner in the past year** |  |  |  |  |  |  |  |  |  |  |  |
| Men living alone | 54.6 | 1.3 | (0.9 to | 1.8) | 0.8 | (0.6 to | 1.2) | 1.0 | (0.7 to | 1.4) | 0.575 |
| Women living alone | 55.0 | 1.3 | (0.9 to | 1.7) | 0.8 | (0.5 to | 1.1) | 0.8 | (0.6 to | 1.1) | 0.019 |

OR= odds ratio, 95% CI= 95% confidence interval. Note: Boldface indicates statistical significance (p<0.05)

aMultivariable adjustment included age (continuous), marital status (living with someone, living alone in overall sample only), race (non-Hispanic white, non-Hispanic black, Hispanic), body mass index (18.5-24.9 kg/m2, 25.0-29.9 kg/m2, ≥ 30 kg/m2), household income (≤ $25000, $25000-74999, ≥$75000),, education level (less than high school, high school, some college and above), smoking status (never smoker, former smoker, current smoker), and physical activity (inactive, insufficiently active, sufficiently active).