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Physical Activity and Obesity Gap Between Black and White Women in the Southeastern U.S.

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Abstract

Background—Differences between black and white women in the associations of sedentary and active behaviors and obesity are mostly unknown.

Purpose—To examine associations of sedentary and active behaviors with BMI, a marker of overall obesity, in a large group of black and white women and to determine whether there are differences by race in these associations.

Methods—Associations between time spent in sedentary and active behaviors and BMI were examined using cross-sectional data collected from 2002 to 2006 at enrollment into the Southern Community Cohort Study (SCCS) from 22,948 black and 7,830 white women living in the southeastern U.S. These associations were examined using linear and polytomous logistic regression models controlling for age, race, income, education, occupational status, tobacco use, marital status, and comorbidities.

Results—Time spent in sedentary behaviors was directly related to BMI while time spent in active behaviors such as moderate and vigorous physical activity was inversely related to BMI, with stronger associations for whites than blacks. White women in the highest quartile of sedentary behaviors were more likely to be moderately (BMI 30–39) or severely (BMI>40) obese than women in the lowest quartile (OR = 2.3; 95%CI 1.8–2.9 for moderate and OR = 4.0; 95%CI 3.1, 5.3 for severe obesity), while the ORs among similarly sedentary black women were modestly elevated (ORs of 1.4; 95%CI 1.2–1.6 and 1.6; 95%CI 1.4–1.8).

Conclusions—There are significant differences in the association of physical activity patterns and obesity between black and white women living in the southeastern U.S. While most guidelines for prevention of obesity and maintaining weight promote increased time in moderate and vigorous physical activity, these results indicate that a reduction in sedentary behavior time may represent another useful strategy in this population.

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Introduction

In the last decades, the prevalence of obesity (defined as a BMI ≥30 kg/m^2) among women in the U.S. has increased.[1] Further, the prevalence of obesity varies by race with black women particularly affected.[1] Marked geographic variation also exists, with the obesity prevalence higher among women in the southeast than in other regions of the U.S..[2]

Prevention of obesity is a major public health issue and a sedentary lifestyle is believed to be an important determinant of obesity.[3–5] Results from the National Health and Nutrition Survey (HHANES) indicate that adults in the U.S. spend the majority of their waking day in sedentary behaviors and only a small amount of time in moderate and vigorous physical activity. Sedentary lifestyle is associated with lower levels of daily energy expenditure[7,8] and increased risk for weight gain independent of total amount of physical activity.[7–9] Moreover, low levels of leisure-time physical activity and reductions in other non-exercise activities (e.g., occupation, transportation) may also contribute to obesity.[10,11] Despite the numerous benefits of physical activity[12] and the recent recommendations of specific physical activity guidelines by health organizations[13,14], in 2005, only 48% of women in the U.S. and 33% of women in the southeastern U.S. reported regular participation in moderate and vigorous activities outside the workplace.[10,15] However, these reports do not include some common household activities (e.g., cleaning, vacuuming) prevalent among women[16,17] and lawn and garden work; important contributors to moderate and vigorous physical activity.

A better understanding of how both sedentary and active behaviors are associated with obesity in women in racially diverse populations may provide insight into strategies to prevent and reduce obesity and its negative health consequences.[18–20] Thus, the goal of this study was to examine associations of sedentary and active behaviors with BMI, in a large group of black and white women enrolled in the SCCS and to determine whether there are differences by race in these associations.

Materials and methods

Study population

Study participants were women enrolled in the SCCS, an ongoing prospective epidemiologic cohort study in the southeastern U.S. focused on racial disparities in cancer incidence and mortality.[21] For the present cross-sectional analysis, all female cohort members who enrolled in the SCCS at community health centers (CHC) located in 12 southeastern states between 2002 and 2006 and self-reported their race as either black or white (n=31,502) were considered. This study was approved by the IRBs at Vanderbilt University and Meharry Medical College.

Data collection

Trained interviewers conducted in-person interviews with all participants at study enrollment.[21] The baseline interview included self-reported current height and weight, medical history, diet, physical activity, tobacco use, health care utilization, and demographic characteristics. The physical activity portion of the baseline questionnaire evaluated a wide range of both active and sedentary behaviors done at home, work, and during leisure time (see Appendix A, available online at www.ajpm-online.net). Questions about sedentary behaviors asked for the amount of time per day typically spent sitting in a car or bus, sitting at work, viewing TV or seeing movies, using a computer at home, and other sitting activities (e.g., sitting at meals, talking on phone).[6,22] Time spent in light, moderate, and hard (vigorous) work were assessed for weekdays and weekend days separately. Examples of light work (e.g., standing at work, office work, shopping, cooking, or child and elderly care), moderate work (e.g., manufacturing work, shop work, cleaning house, gardening, or home repair), and vigorous work (e.g., construction work, farming, or other hard labor) were presented on hand cards during the interview. Time spent in slow (e.g., moving around, walking at work, walking the dog,) and fast walking (climbing stairs, walking for transportation, exercise) was also assessed. The questions for household/occupational activity and walking were not mutually exclusive and are presented separately. Typical weekly time spent in moderate (e.g., bowling, dancing, golf, softball) and vigorous (e.g., jogging, aerobics, bicycling, weight lifting, or basketball) sports and exercise was also obtained. Time spent in occupational/household activities and leisure time sports and exercise were combined into the active behaviors category.

Duration reports (hours/day) were converted to estimates of physical activity–related energy expenditure expressed as METs for the specific activity categories (MET-hours/day) using methods described in the Compendium of Physical Activity.[22]

Physical activity questionnaire validation

The physical activity questionnaire (PAQ) used in this study was examined in a validation study including 59 randomly selected SCCS women (*n*=36 black). Participants wore validated RT3 accelerometers (StayHealthy, Monrovia, CA) on 1 to 4 separate occasions, 2–4 months apart, for 1–7 days each time.[23,24] Participants completed a physical activity questionnaire at baseline and approximately 1 year later. Spearman correlation (ρ) coefficients for reproducibility of the sitting items between these two questionnaires ranged from 0.24 to 0.53, with the highest values being observed for TV and movie viewing (ρ=0.53) and for sitting at work (ρ=0.48). There were no meaningful differences between white and black women indicating that the PAQ demonstrates reasonable reproducibility and validity. Further, the validity results comparing the PAQ to an objective physical activity measurement were similar to results from other studies among middle-aged women.[25,26]

Statistical analysis

Women were excluded from this analysis if they were missing information on height or weight (*n*=318) or had a BMI value less than 18.5 kg/m^2 (*n*=400) or greater than 80 kg/m^2 (*n*=6) leaving a final study population of 30,778 women. The primary outcome was BMI calculated from self-reported weight and height (kg/m^2). A polytomous measure of BMI was also calculated by categorizing women as normal weight (BMI< 25 kg/m^2), overweight (BMI 25–29.9 kg/m^2), moderately obese (BMI 30–39.9 kg/m^2) or severely obese (BMI >40 kg/m^2)[27].

All individual values for sedentary and physical activity behaviors that were above the 99th percentile were set to the 99th-percentile value. Summary measures were calculated for all sedentary time combined and all activity time combined (including light, moderate, and vigorous household/occupational work, walking, and moderate/vigorous sports). Quartiles of sedentary behavior and active behaviors were determined from the entire study population.

Polytomous logistic regression models were used to estimate ORs and 95% CIs describing associations between BMI categories and sedentary and physical activity measures. Linear regression models were used to evaluate associations between continuous measures of BMI, and sedentary and active behaviors. A list of *a priori* confounders was generated from the literature and potential confounders were categorized as shown in Appendix A (available online at www.ajpm-online.net). The potential confounders were age at SCCS enrollment, household income, educational attainment, occupational status, cigarette smoking status, and marital status, and were included in all multivariate models. Other potential confounders included self-reported stroke, heart attack or coronary artery bypass surgery, hypertension, diabetes, arthritis, emphysema, and depression. Most models were stratified by race because of the focus on evaluating whether the associations between obesity and physical activity differed between blacks and whites. In order to assess interactions between race and activity variables, models including women of both races were analyzed and the likelihood ratio test was used to compare models with and without race–activity interaction terms. SAS/STAT software, Version 9.1 of the SAS System for Windows (SAS Institute Inc., Cary, NC,) was used for all analyses which were conducted in 2009 and 2010.

Results

Women were on average in their early 50s when they enrolled in the SCCS (see Appendix B, available online at www.ajpm-online.net). Over half of the women in each racial group had a household income less than $15,000 in the past year and education levels were generally low. Reported comorbidities included previous heart attack or coronary artery bypass (*n*=1,752; 5.7%), stroke (*n*=2,117; 6.9%), hypertension (*n*=18, 636; 60.7%), diabetes (*n*=7,350; 23.9%), arthritis (*n*=13,024; 42.4%), emphysema (*n*=3,590; 11.7%), and depression (*n*=8,940; 29.1%). Black women were significantly more likely to be moderately or severely obese than white women (58% vs 50%, χ^2 $P<0.0001$).

Women reported spending an average of 8–10 hrs/d in sedentary behaviors (see Appendix C, available online at www.ajpm-online.net). In both blacks and whites, sedentary time was significantly greater among women with higher BMIs. When sedentary time was evaluated as a proportion of total time reported, heavier women tended to spend a larger proportion of their time in sedentary behaviors than did normal weight women, with the differences more pronounced for whites than blacks. Time spent in active behaviors was lowest among women with higher BMI, whereas no clear trends were observed between time spent in light physical activity and BMI.

The relationship between continuous BMI and total time spent in sedentary and active behavior was assessed separately for blacks and whites using simple linear regression. The slopes for the BMI–sedentary behaviors relationship varied significantly ($P<0.0001$) by race but the slopes for the BMI–active behaviors relationship were not markedly different between black and white women (see Appendix x, available online at www.ajpm-online.net). However, there was a significant rise in adjusted average levels of BMI among black and white women with increasing quartiles of sedentary behavior (Figure 1).

Time spent in both slow and fast walking tended to decline with increasing BMI among both black and white women (Appendix C, available online at www.ajpm-online.net). The differentials were greatest for fast walking with severely obese women spending less than half the time normal weight women were spending in this activity.

ORs for moderate and severe obesity rose monotonically with higher levels of sedentary behavior (Table 1). The trends were stronger among white women, rising to an OR of 4.03 (95% CI 3.08–5.28) among women with severe obesity in the highest quartile of sedentary behavior. In contrast, among black women in the same quartile, the OR was 1.56 (95%CI 1.35–1.81). There was a significant but modest rise in overweight status among white women in the highest sedentary group (OR = 1.30, 95%CI 1.05–1.61), but no trend was evident among black women. Active behaviors were inversely associated with obesity with the odds of being severely obese lower in the highest quartile of physical activity compared to the lowest in black and white women (OR=0.70, 95%CI=0.60 – 0.81, and OR = 0.65, 95%CI=0.51–0.84), respectively.

The joint effects of time spent in sedentary and active behaviors are presented in Tables 2 (black women) and 3 (white women). The OR of being obese was greater among both white and black women who jointly spent more time in sedentary behavior and less time in active behaviors. However, this trend was substantially stronger in white as compared to black women (ORs for BMI>40 kg/m^2 were 8.56 (95%CI 4.97–20.63) versus 2.25 (95%CI 1.64–3.09)). Time spent in sedentary behavior was positively associated with obesity even among women with the highest levels of active behaviors in whites (OR 2.03; 95%CI 1.19–4.63) and blacks (OR 1.22; 95%CI 0.91–1.65).

Discussion

The major findings of this study are that sedentary behaviors were strongly associated with obesity and this association was stronger in white compared to black women after adjusting for age, SES, and comorbidities. The odds of severe obesity were nearly 4.5 times higher in white women and 1.5 times higher in black women in the highest quartile of sedentary behavior. Conversely, increased time spent engaged in active behaviors was associated with modestly decreased odds of overweight and obesity.

This study differs in terms of methodology and population from other population-based estimates of sedentary and active behaviors in women. Nevertheless, similar outcomes to those observed in present study were reported by two large longitudinal studies targeting middle-aged U.S. women. Results of the Study of Women's Health Across the Nation showed that physical activity and daily routine that included more transportation activity and less TV viewing were both inversely related to changes in body weight.[28] In the Nurses Health Study, increased TV viewing and sitting at work were both associated with increased risk of obesity while standing or walking at home was associated with a reduction in obesity.[29] Moreover, the long-term results from the National Weight Control Registry highlight the importance of reductions in sedentary behaviors for obesity intervention efforts.[30] These studies, however, have very low participation of blacks which does not allow for comparisons with the estimates from this study among black women warranting future studies in ethnically diverse populations.

National data reporting time spent in sedentary activities by women are limited. Results from the American Time Use Survey showed that a large proportion of the average 15.4-hour waking day was spent in activities that expend little energy.[31] Middle-aged women participating in the 2003–2004 NHANES spent 55%–60%, or 7.5–8.0 hrs/d, in sedentary behaviors.[6] Women in the current study similar spent also approximately 60% of their total time in sedentary behaviors with no significant differences between black and white women. However, blacks spent more time viewing TV and movies and less time in other sitting activities than whites. Comparing present results with other reports is difficult, since to our knowledge this is the first examination of sedentary behavior in large numbers of middle-aged and older black and white women. Interpreting the absolute time of sedentary behavior is difficult because its duration varies depending on reported total waking hours during the day. Therefore, the percentage of total reported time spent in sedentary or any other behavior may be a useful measure for evaluating these behaviors. Using the percentage of waking time criterion suggests that women enrolled in the SCCS spend similar amounts of time in sedentary behaviors when compared to a representative sample of U.S. women.[6]

Obese women performed less physical activity than non-obese women across all activities examined. At the other end of the activity spectrum, a negative association between greater physical activity and obesity among white but not black women was found. Evidence from other studies also suggests that physical activity is inversely associated with overweight and obesity.[4,32] Wenche and colleagues[33] have examined this association in a cohort of healthy women and found that physical activity was a significant predictor of BMI adjusted for age and education after 11-year follow-up.

Walking was analyzed as a separate physical activity dimension because it has known clinical importance and is the most frequent type of leisure time physical activity in women living in the southeastern U.S.[34,35] In this study, obese women spent less time than non-obese women engaged in walking. In the Nurses Health Study, time spent in walking was inversely associated with obesity development.[9] Minimal differences were observed in this study in walking time between black and white women, which was not evaluated in the nearly all-white Nurses Health Study. The racial differences in the relationship of sedentary and active behaviors and BMI found in this study might be affected by interactions among socioeconomic, environmental, and cultural factors. It has been reported that social class may moderate the relationship between race/ethnicity and physical activity[36] and that physical activity may mediate the relationship between race/ethnicity and disease.[37] Other previous reports suggest that environmental factors exert an important positive influence on physical activity levels, whereas low SES contributes to inactivity[38] and that the age-adjusted prevalence of leisure-time inactivity depends of the employment status.[39] However, the black and white SCCS participants were enrolled within the same communities and had similar income and education levels making them more comparable across socioeconomic lines than in most other cohorts.

Another plausible explanation for the observed differences in responses to sedentary and active behaviors could be related to differences between black and white women in BMI performance as a marker of body composition and body fat distribution. Several studies report that for a similar waist circumference and BMI, blacks have less visceral fat than whites.[40,41] For example, the hip circumferences of blacks have been found to be smaller than those in whites, resulting in an increased the waist-to-hip ratio for a given amount of central fat.[42] Evans et al. reported that the relationship between BMI and percent fat measured by DEXA differs by race with black women having lower body fatness than white women at the same BMI.[43] Differences also exist between blacks and whites with respect to fat-free body mass with blacks generally having more bone mineral density than whites.[44]

Finally, the racial differences could also be affected by differential reporting of physical activity behaviors, perhaps due to cultural influences and possibility of over- or under-reporting of physical activity–related behaviors.[45] However, the reproducibility and validity of the instrument were similar for both black and white women. There is a need for further work on the PAQ to improve the wording so as to enhance test–retest reliability in both black and white women. However, given the highly significant results of the study, the study findings are worthy of further examination or consideration regarding public health measures to decrease obesity. Limitations of the study should be considered when interpreting the results. First, the physical activity questions especially related to sedentary behaviors used should be assumed to contain a substantial level of measurement error.[25] Second, the cross-sectional design limits inference regarding casualty. Because of this limitation, this study focused on the association between current BMI and physical activity. Third, self-reported measures of weight and height were used to calculate BMI. Some reports indicate that height tends to be over-reported while weight tends to be under-reported.[46,47,48] However, among the approximately 25% of women in the SCCS who had their height and weight measured in the CHC on the day of the baseline interview, there was a high concordance between self-reported and measured values (Pearson correlation coefficients>0.95). Differences between self-reported and measured weights also did not differ by BMI category, race, education, or income categories.

This study also has several strengths. First, the large study population allowed for robust stratification into four BMI categories. Second, the activity assessment was reasonably comprehensive and included both occupational and leisure time activities containing a number of sedentary behaviors. Third, the SCCS includes a large number of women of low SES, a population that has been traditionally under-represented in the physical activity literature. Finally, the black and white participants were from the same communities with similar income and education levels creating a study population that is more socioeconomically similar between race groups than is found in most other epidemiologic studies.

In summary, in this cross-sectional study of black and white women in the southeastern U.S., women spent the majority of their time in sedentary behaviors and the prevalence of sedentary behaviors was higher among obese women than among non-obese women. In addition, sedentary behavior was more strongly associated with obesity in white than in black women. Further, the odds of being overweight or obese were associated more strongly with sedentary than with active behaviors and this association was also stronger in white than in black women. These findings support the notion that both sedentary and active behaviors have an influence on obesity. Both behaviors are considered risk factors for developing a vicious cycle, in which sedentary behaviors increase and active behaviors decrease as a consequence of overweight and obesity.[4,49,50] However, most guidelines for weight loss, retaining healthy weight, and chronic disease prevention in adults promote increasing time spent in intense activities and exercise. These results suggest that in middle-aged and older women, a reductions in sedentary time may represent a strategy that complements –and may extend– obesity prevention efforts that focus on moderate and vigorous physical activity.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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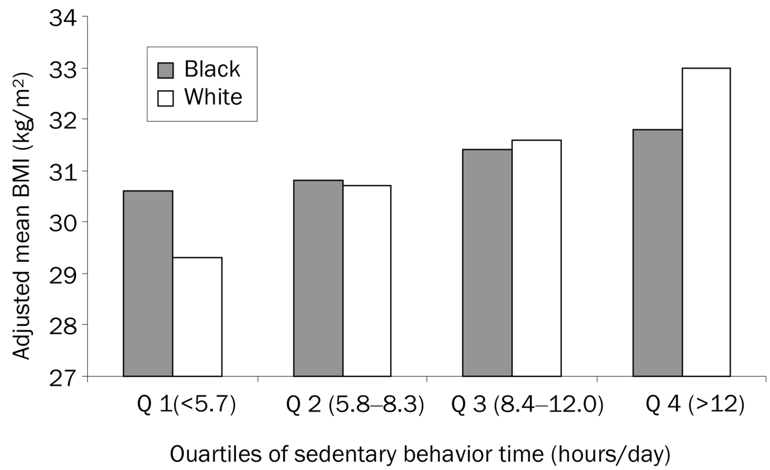

Figure 1.

Adjusted mean BMI values for quartiles of sedentary behavior time from multivariate linear regression models in black and white women enrolled in the Southern Community Cohort Study. BMI means are adjusted for current age, income, education, occupational status, cigarette smoking status, marital status, previous diagnose with stroke, heart attack, hypertension, diabetes, arthritis, emphysema, and depression.

Table 1

Association between BMI and activity among black (*n*=22,948) and white women (*n*=7,830).[a,b]

	BMI 25–29 vs <25		BMI 30–39 vs <25		BMI ≥40 vs <25	
Sedentary Behavior Time (hours/day) [c]						
White Women	OR	95% CI	OR	95% CI	OR	95% CI
Quartile 1 (<5.7)				ref		
Quartile 2 (5.8 – 8.3)	1.06	(0.89, 1.25)	**1.27**	**(1.07, 1.50)**	**1.58**	**(1.24, 2.03)**
Quartile 3 (8.4 – 12.0)	1.02	(0.85, 1.21)	**1.44**	**(1.21, 1.71)**	**2.26**	**(1.77, 2.89)**
Quartile 4 (>12.0)	**1.30**	**(1.05, 1.61)**	**2.02**	**(1.64, 2.48)**	**4.03**	**(3.08, 5.28)**
Black Women						
Quartile 1 (<5.7)				ref		
Quartile 2 (5.8–8.3)	1.02	(0.90, 1.15)	1.01	(0.90, 1.14)	1.12	(0.96, 1.29)
Quartile 3 (8.4–12.0)	1.02	(0.90, 1.15)	**1.12**	**(1.00, 1.26)**	**1.36**	**(1.18, 1.57)**
Quartile 4 (>12.0)	0.99	(0.87, 1.12)	**1.19**	**(1.05, 1.34)**	**1.56**	**(1.35, 1.81)**
Active Behavior Time (hours/day)[d]						
White Women						
Quartile 1 (<1.0)				ref		
Quartile 2 (1.1–2.0)	0.88	(0.73, 1.06)	0.91	(0.76, 1.09)	**0.74**	**(0.58, 0.94)**
Quartile 3 (2.1–4.0)	0.91	(0.76, 1.10)	0.84	(0.71, 1.01)	**0.79**	**(0.62, 0.99)**
Quartile 4 (> 4.0)	0.84	(0.69, 1.02)	**0.70**	**(0.58, 0.85)**	**0.65**	**(0.51, 0.84)**
Black Women						
Quartile 1 (<1.0)				ref		
Quartile 2 (1.1–2.0)	1.00	(0.88, 1.14)	0.93	(0.82, 1.04)	0.96	(0.83, 1.11)
Quartile 3 (2.1–4.0)	1.05	(0.93, 1.18)	0.93	(0.83, 1.05)	0.91	(0.80, 1.05)
Quartile 4 (>4.0)	0.95	(0.84, 1.08)	**0.80**	**(0.71, 0.90)**	**0.70**	**(0.60, 0.81)**

[a]Participating women were enrolled in enrolled in the Southern Community Cohort Study.

[b]Sedentary behaviors included viewing TV and movies, sitting at work and other sitting.

[d]Active behaviors include light, moderate and vigorous occupational/household activities and exercise and sports.

[b]The association was assessed using ORs and 95% CIs derived from race-stratified polytomous logistic regression models

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[b]Models adjusted for age, income, education, current occupational status, cigarette smoking status, marital status, and self-reported comorbidities (including heart attack/coronary artery bypass surgery, stroke, diabetes, hypertension, depression, emphysema, and arthritis). Models for each race group included both moderate/vigorous physical activity time quartiles and sedentary behavior time quartiles.

Table 2

Joint effects of sedentary and active behaviors on ORs of being obese in black women.[a, b, c, d]

Total sedentary behavior (hrs/d)		Total active behaviors (hours/day)							
		Quartile 4 (> 4.0)		**Quartile 3 (2.1– 4.0)**		**Quartile 2 (1.1–2.0)**		**Quartile 1 (<1.0)**	
BMI 25–29 vs BMI < 25 kg/m²					*Highest Activity Level Lowest Activity Level*				
	Least sedentary	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Quartile 1 (<5.7)			ref	1.11	(0.86, 1.43)	1.01	(0.78, 1.31)	1.04	(0.81, 1.33)
Quartile 2 (5.8–8.3)		1.01	(0.79, 1.30)	1.20	(0.93, 1.53)	0.97	(0.75, 1.25)	1.06	(0.82, 1.01
Quartile 3 (8.4–12.0)		1.03	(0.81, 1.32)	1.03	(0.81, 1.30)	1.13	(0.88, 1.46)	1.06	(0.82, 1.03
Quartile 4 (>12.0)		0.95	(0.74, 1.20)	1.08	(0.84, 1.38)	1.09	(0.84, 1.43)	1.02	(0.78, 0.95
	Most sedentary								
BMI 30–39 vs BMI < 25 kg/m²									

Total sedentary behavior (hrs/d)	Total active behaviors (hours/day): Quartile 4 (> 4.0)		Quartile 3 (2.1– 4.0)		Quartile 2 (1.1–2.0)		Quartile 1 (<1.0)	
Quartile 1 (<5.7)		ref	1.13	(0.88, 1.44)	1.04	(0.81, 1.33)	1.16	(0.92, 1.47)
Quartile 2 (5.8–8.3)	0.94	(0.73, 1.19)	1.14	(0.90, 1.45)	1.12	(0.88, 1.43)	1.18	(0.92, 1.52)
Quartile 3 (8.4–12.0)	1.05	(0.83, 1.34)	1.17	(0.93, 1.46)	**1.32**	**(1.04, 1.69)**	**1.34**	**(1.05, 1.70)**
Quartile 4 (>12.0)	1.11	(0.88, 1.39)	**1.35**	**(1.07, 1.71)**	1.24	(0.96, 1.60)	**1.45**	**(1.12, 1.87)**
BMI ≥40 vs BMI < 25 g/m^2								
Quartile 1 (<5.7)		ref	**1.39**	**(1.02, 1.90)**	1.20	(0.87, 1.64)	1.22	(0.91, 1.65)
Quartile 2 (5.8–8.3)	1.02	(0.74, 1.41)	**1.43**	**(1.05, 1.94)**	1.32	(0.97, 1.81)	**1.55**	**(1.13, 1.02)**
Quartile 3 (8.4–12.0)	**1.38**	**(1.01, 1.87)**	**1.50**	**(1.13, 2.01)**	**1.88**	**(1.39, 2.56)**	**1.80**	**(1.33, 1.38)**
Quartile 4 (>12.0)	1.32	(0.98, 1.77)	**1.87**	**(1.39, 2.51)**	**2.15**	**(1.57, 2.95)**	**2.25**	**(1.64, 1.32)**

[a]Participating women were enrolled in enrolled in the Southern Community Cohort Study.

[b]BMI (BMI kg/m^2) category compared to healthy BMI (<25 kg/m^2) category.

[c]The OR and 95% CI were calculated using race-stratified polytomous logistic regression models.

[d]Models adjusted for current age, income, education, occupational status, smoking status, marital status, and self-reported comorbidities (including heart attack/coronary artery bypass surgery, stroke, diabetes, hypertension, depression, emphysema, and arthritis).

Table 3

Joint effects of sedentary and active behaviors on ORs of being obese in white women.[a, b, c, d]

Total sedentary behavior (hrs/day)	Total active behaviors (hrs/day): Quartile 4 (> 4.0)		Quartile 3 (2.1 – 4.0)		Quartile 2 (1.1 –2.0)		Quartile 1 (< 1.0)	
BMI 25–29 vs BMI < 25 kg/m²			*Highest Activity Level Lowest Activity Level →*					
Least Sedentary ↓								
Quartile 1 (<5.7)		ref	1.05	(0.76, 1.46)	1.34	(0.96, 1.87)	1.29	(0.94, 1.79)
Quartile 2 (5.8 – 8.3)	1.18	(0.85, 1.66)	**1.40**	**(1.02, 1.92)**	1.00	(0.72, 1.39)	1.32	(0.95, 1.84)
Quartile 3 (8.4 – 12.0)	1.14	(0.79, 1.63)	1.16	(0.84, 1.60)	1.27	(0.90, 1.79)	1.17	(0.85, 1.63)
Quartile 4 (>12.0)	1.41	(0.93, 2.15)	1.44	(0.95, 2.18)	1.19	(0.77, 1.83)	**1.95**	**(1.33, 2.87)**
Most Sedentary								
BMI 30-39 vs BMI < 25 kg/m²								

	Total active behaviors (hrs/day)							
Total sedentary behavior (hrs/day)	**Quartile 4 (> 4.0)**		**Quartile 3 (2.1 – 4.0)**		**Quartile 2 (1.1 –2.0)**		**Quartile 1 (< 1.0)**	
Quartile 1 (<5.7)		ref	1.14	(0.81, 1.60)	**1.42**	**(1.01, 2.01)**	**1.43**	**(1.03, 2.00)**
Quartile 2 (5.8 – 8.3)	1.20	(0.85, 1.70)	**1.55**	**(1.12, 2.15)**	**1.46**	**(1.06, 2.03)**	**2.06**	**(1.48, 2.87)**
Quartile 3 (8.4 – 12.0)	**1.62**	**(1.13, 2.32)**	**1.66**	**(1.20, 2.30)**	**2.08**	**(1.48, 2.93)**	**1.82**	**(1.31, 2.52)**
Quartile 4 (>12.0)	**1.99**	**(1.31, 3.02)**	**2.80**	**(1.88, 4.18)**	**2.27**	**(1.50, 3.43)**	**2.95**	**(2.01, 4.31)**
BMI 40+ vs BMI < 25 kg/m^2								
Quartile 1 (<5.7)		ref	1.57	(0.90, 2.74)	**1.86**	**(1.05, 3.29)**	**2.03**	**(1.19, 3.48)**
Quartile 2 (5.8 – 8.3)	**2.15**	**(1.24, 3.73)**	**2.77**	**(1.63, 4.71)**	**2.07**	**(1.20, 3.55)**	**3.14**	**(1.85, 5.32)**
Quartile 3 (8.4 – 12.0)	**3.59**	**(2.08, 6.22)**	**3.27**	**(1.95, 5.49)**	**3.28**	**(1.91, 5.60)**	**4.27**	**(2.58, 7.08)**
Quartile 4 (>12.0)	**4.97**	**(2.75, 8.99)**	**6.49**	**(3.67, 11.49)**	**5.64**	**(3.14, 10.13)**	**8.56**	**(4.97, 14.72)**

[a]Participating women were enrolled in enrolled in the Southern Community Cohort Study.

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[b] BMI kg/m^2 category compared to healthy BMI (<25 kg/m^2) category.

[c] The ORs and 95% CIs were calculated using race-stratified polytomous logistic regression models.

[d] Models adjusted for current age, income, education, occupational status, smoking status, marital status, and self-reported comorbidities (including heart attack/coronary artery bypass surgery, stroke, diabetes, hypertension, depression, emphysema, and arthritis).