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Gender-Specific Factors Associated with Obesity or Overweight in Adolescents: Connecticut's 2009 Youth Risk Behavior Survey

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Summary

Objective: The purpose of this study was to identify factors independently associated with obesity or overweight in a representative sample of Connecticut public high school students and to determine if such associations were gender-specific.

Methods: Cross-sectional data from 2,392 participants in Connecticut's 2009 Youth Risk Behavior Survey were analyzed. Multivariate logistic regression modeling was used to evaluate the independent effect of predictor variables on the outcome of obesity or overweight. The multivariate logistic regression model was stratified by gender to identify different associations in boys and girls. Bivariate analysis was used to examine associations between obesity or overweight and weight perception, weight control, and harassment.

Results: Male gender was itself strongly associated with obesity or overweight. Significant positive associations observed only in girls were being non-Hispanic black and having suicidal ideation. Significant positive associations observed only in boys were being Hispanic, excessive television watching, and lower academic performance. Factors that were significantly associated with obesity or overweight in both genders included a positive association with poorer general health, and a negative association with current smoking. Bivariate analysis indicated that obese or overweight students were significantly more likely than their peers to report the use of unhealthy weight control practices and to report harassment on school property because of weight, size, or physical appearance.

Conclusions: These findings support the presence of gender differences in predictors of obesity or overweight in Connecticut high school students. Gender-specific associations should be borne in mind when developing and targeting public health interventions and prevention programs that address obesity and obesity-related diseases among adolescents.

Key Words: Gender, Adolescents, Obesity, Overweight, Risk Factors

Introduction

Childhood obesity represents a serious and growing public health problem in the United States and elsewhere in the world.[1-3] In the United States, the prevalence of obesity among adolescents has approximately tripled since 1980.[3] Childhood obesity is associated with a wide range of chronic health problems that may affect virtually every organ system, and include type 2 diabetes, hypercholesterolemia, hypertension, asthma, hepatic steatosis, and sleep apnea.[1,2,4] Obese and overweight adolescents are also at risk for psychosocial problems such as low self-esteem, depression, and social stigmatization.[5] In addition, adolescents who are obese or overweight have a high likelihood of being obese as adults,[6,7] placing them at increased risk for chronic diseases and premature mortality later in life.[8,9] Finally, obesity and overweight have been reported to be associated with other health-risk behaviors in adolescents, such as violent behavior in boys and substance abuse in girls.[10]

Contributing factors to childhood and adolescent obesity and overweight may be genetic, behavioral or environmental in nature.[11] Gender differences may play an important role in the development of obesity,[12] and gender-focused interventions to reduce childhood obesity and overweight have recently been advocated.[13] In this study, we examined cross-sectional data of Connecticut public high school students to identify factors that were significantly associated with obesity or overweight, and to determine if such associations were gender-specific. Associations were evaluated for variables related to demographic factors, academic performance, physical activity, sedentary activity, diet, tobacco use, physical and mental health, and family interaction. The independent effects of these factors in explaining obesity or overweight were determined using a multivariate regression model, stratified by gender. Unique associations are important to identify because they may be helpful in developing and targeting effective interventions and prevention programs to reduce obesity and obesity-related diseases. Other associations with

obesity and overweight status were examined in this study using bivariate analysis, and included weight perception, weight control practices, and harassment.

Methods

Cross-sectional data from the 2009 Connecticut Youth Risk Behavior Survey (YRBS) were analyzed in this study. This is an anonymous, school-based survey administered biennially to Connecticut public high school students in grades 9-12. The survey contains 99 multiple-choice questions[14] and is based on the core questionnaire from the national YRBS administered by the Centers for Disease Control and Prevention (CDC).[15] The YRBS monitors priority health risk behaviors and contains questions related to positive influences, dietary behaviors, sexual behaviors, alcohol and other drug use, physical activity, school environment, and behaviors that contribute to unintentional injuries and violence.[16] As previously described elsewhere,[17] a two-stage cluster design by schools and classes is employed to obtain a representative student sample. In 2009, 2,392 students from 48 public high schools across the state completed the survey. The school response rate for the survey was 76%, and the student response rate was 84%, constituting an overall response rate of 64%.[18] This meets the CDC criteria for being considered representative of high school students in Connecticut.[16]

Body Mass Index (BMI) (weight in kg/height in m^2) was calculated using self-reported height and weight from the Connecticut YRBS. CDC 2000 growth charts specific for age and gender were used to determine cut-offs for the outcome variable of obesity or overweight.[19] Adolescents were considered obese if their gender-specific BMI-for-age was at or above the 95th percentile, and overweight if their BMI was at or above the 85th percentile but below the 95th percentile. Obese and overweight individuals were combined into a single group for our analysis.

Predictor variables included in our multivariate logistic regression analysis were considered candidate risk factors for obesity based on literature review. These were gender; race/ethnicity; grade level; academic performance during the past 12 months; physical activity during the past 7 days; time spent watching television on an average school day; time spent playing video games or using the computer (not for school work) on an average school day; fruit and vegetable consumption during the past 7 days; smoking cigarettes during the past 30 days; general health; seriously considering suicide during the past 12 months; participation in an organized after-school, evening or weekend activity during the past 7 days; number of meals eaten with family during the past 7 days; and number of hours of sleep on an average school night. For the purposes of this study, race/ethnicity was divided into four groups: white (non-Hispanic), black (non-Hispanic), Hispanic, and other races. Fruit and vegetable consumption during the past 7 days was calculated by combining answers to six separate questions about the consumption of 100% fruit juice, fruit, green salad, potatoes (excluding French fries, fried potatoes, or potato chips), carrots, and other vegetables.[19] To determine how frequently students were physically active for a total of at least 60 minutes per day, respondents were asked to add up all the time spent in any kind of physical activity that increased their heart rate or made them breathe hard some of the time. In our analysis, grade level was dichotomized as 9th-10th and 11th-12th; academic performance was categorized as grades of mostly A's/B's, mostly C's, and mostly D's/F's; and general health was categorized as excellent/very good, good, or fair/poor.

Survey data were weighted to adjust for student non-response and the distribution of Connecticut students by grade, gender, and race/ethnicity.[17] All statistical analyses used SUDAAN statistical software in order to account for the complex sampling design. Bivariate relationships between obesity or overweight and other study variables were characterized using either Chi-square analysis or an unadjusted odds ratio (OR) to test for group differences.

Multivariate logistic regression modeling was used to evaluate the independent effect of predictor variables on the outcome of obesity or overweight; adjusted ORs and corresponding 95% confidence intervals (CI) were ascertained by this method. The multivariate logistic regression model was stratified by gender to identify different associations in boys and girls. An α level set at 0.05 was used in all analyses.

Results

Characteristics of the 2,392 respondents in the survey are shown in Table 1. Prevalence estimates were 10.4% for obese and 14.5% for overweight. In boys, the prevalence estimates were 13.8% obese and 16.7% overweight, while for girls they were 6.7% obese and 12.2% overweight. Most students surveyed were not meeting the national guideline of 1 hour of physical activity daily; only 45.2% of respondents reported that they were physically active for 60 minutes per day during 5 or more of the past 7 days. In addition, only 21.0% of students were found to be meeting the national guideline of eating fruits and vegetables 5 or more times per day during the past 7 days. Sedentary activities were also common, with 30.2% of students reporting watching television for 3 or more hours on an average school day, and 27.9% reporting playing video games or using the computer (not for school work) for 3 or more hours on an average school day.

Table 2 shows associations between obesity or overweight and weight perception, weight control, and harassment. Among students who were obese or overweight, 55.5% perceived themselves as slightly overweight and 10.4% as very overweight. Obese or overweight students were more likely than other students to report trying to lose weight (72.4% vs. 37.8%, $p<0.001$), and this held true both for exercising to lose weight (76.5% vs. 57.0%, $p<0.001$), and eating less food, fewer calories, or low-fat foods (49.7% vs. 35.4%, $p<0.001$). Obese or overweight

students were also more likely than other students to have employed unhealthy weight control practices to lose or to maintain weight during the past 30 days. This included fasting for 24 hours (13.3% vs. 6.9%, p=0.003); and taking laxatives or diet pills or powders (without a physician's advice) or vomiting (6.7% vs. 4.4%, p=0.028). In addition, a total of 29.5% of obese or overweight students reported that they had been harassed on school property because of their weight, size, or physical appearance in the past 12 months, which was significantly greater than 19.9% of other students who reported such harassment (p=0.001).

Results of multivariate logistic regression analysis are shown in Tables 3-5. In the model including both male and female students (Table 3), boys were significantly more likely than girls to be obese or overweight (OR 2.52, 95% CI 2.00 - 3.19), and Hispanics were more likely to be obese or overweight than non-Hispanic whites (OR 1.46, 95% CI 1.12 - 1.91). Other factors that were positively associated with obesity or overweight were watching 3 or more hours of television on an average school day (OR 1.43, 95% CI 1.04 - 1.96); seriously considering suicide during the past 12 months (OR 1.50,1.07, 2.09); and having general health that was good (OR 2.00, 95% CI 1.62 - 2.48), or fair/poor (OR 4.49, 95% CI 3.26 - 6.19) relative to general health that was excellent or very good. A negative association was observed among students who reported smoking cigarettes during the past 30 days (OR 0.54, 95% CI 0.36 - 0.80).

After stratifying the multivariate logistic model by gender, differences were seen in the independent associations for females (Table 4) and males (Table 5). Among girls, positive associations included being non_Hispanic black (OR 2.14, 95% CI 1.28 - 3.60); seriously considering suicide during the past 12 months (OR 2.38, 95% CI 1.65 - 3.43); and good (OR 2.11, 95% CI 1.42 - 3.14), or fair/poor (OR 5.02, 95% CI 2.94 - 8.58) general health. A negative association was observed for smoking cigarettes in the past 30 days (OR 0.43, 95% CI 0.20 - 0.92). Only two of these associations were statistically significant among boys: good (OR 2.01,

95% CI 1.48 - 2.73) or fair/poor (OR 4.49, 95% CI 2.47 - 8.17) general health, and smoking cigarettes in the past 30 days (OR 0.57, 95% CI 0.34 - 0.95). Other significant associations observed in boys were being Hispanic (OR 1.49, 95% CI 1.02 - 2.18); watching 3 or more hours of television on an average school day (OR 1.83, 95% CI 1.29 - 2.59); and receiving grades that were mostly C's (OR 1.55, 95% CI 1.12 - 2.15), or mostly D's/F's (OR 2.52, 95% CI 1.16 - 5.47) relative to mostly A's/B's.

Discussion

Obesity and overweight remain a serious public health concern among Connecticut adolescents, affecting more than one in four high school students. The prevalence estimates of 10.4% for obesity and 14.5% for overweight are quite similar to those observed in the Connecticut YRBS in 2007 (12.3% and 13.3%)[15] and 2005 (11.2% and 14.7%).[20] The prevalence estimates are slightly less than those observed at the national level in the CDC's YRBS (12.0% obese and 15.8% overweight), although these differences are not statistically significant.[21] In the national survey, boys were significantly more likely to be obese (but not overweight) than girls.[22]

The results of this study suggest that independent predictors of obesity or overweight vary based on gender among Connecticut high school students. Importantly, male gender was itself strongly associated with obesity or overweight, with the odds in boys being approximately 2.5-fold higher than in girls after adjusting for other covariates. Among girls, being non-Hispanic black and having suicidal ideation were significantly associated with obesity or overweight. Among boys, being Hispanic, watching excessive television, and having lower academic performance were significantly associated with obesity or overweight. In both boys

and girls, those who reported poorer general health were more likely to be obese or overweight, while those who reported themselves to be current smokers were less likely.

The gender-specific nature of the association of having considered suicide in the past 12 months is particularly striking. For girls, those reporting suicidal ideation were more than twice as likely to be obese or overweight than those who had not. By contrast, a positive association was not observed in boys. Prior studies have identified an association of body mass index or perceived weight and suicidal ideation or suicide attempts in adolescents.[23-27] Swahn et al. analyzed data from the 2007 national YRBS and found that perceived and actual obesity or overweight was associated with suicide attempts, with no interaction by gender.[26] Neumark-Sztainer et al. previously reported a gender-specific association of suicidal ideation with obesity (but not overweight) in girls, among Minnesota adolescents in grades 7-12.[23] The relationship of obesity and overweight with depression is a complex one; a recent meta-analysis indicated that a bidirectional association exists, with depression being predictive of developing obesity, and obesity increasing the risk of depression.[28] Possible mediators for the increased risk of obesity in depressed individuals include neuroendocrine disturbances, adoption of an unhealthy lifestyle, and the use of psychiatric medications that induce weight gain.[28] Although in our analysis the variable of suicidal ideation was used as a predictor of obesity or overweight, from a public health standpoint the reciprocal relationship also has clear importance with regard to suicide prevention. It is possible that gender difference observed in the association between suicidal ideation and obesity may relate in part to differences in the degree of social stigmatization, which in some study populations has been found to be more severe in obese female adolescents than obese male adolescents.[29]

Obesity or overweight was associated with grades of mostly C's or mostly D's/F's in boys but not girls. Poor academic performance might, therefore, be a useful marker for obesity and

overweight risk among male adolescents. In addition, boys who reported watching more than 3 hours of television on an average school day were more likely to be obese or overweight. Studies of the national YRBS found increases in obesity in both genders associated with watching 3 or more hours of television.[30-32] An association was not observed among either boys or girls in our study with the sedentary activity of playing video games or using the computer for 3 or more hours for an average school day. It has been speculated that playing video games or using the computer may differ from television watching in its effects on physical activity or eating habits.[33] For example, television watching may be accompanied by snacking and has been associated with increased fast food consumption.[34]

General health, smoking and race/ethnicity were associated with obesity or overweight in both male and female students. For both genders, the odds of obesity or overweight increased approximately 2-fold if general health was described as good, and 4-5-fold if it was described as fair or poor, compared to general health described as excellent or very good. The predictive value of health for obesity and overweight may reflect, at least in part, increased caloric intake and decreased physical activity among children with certain chronic health conditions.[35] Individuals who smoked were found to be about half as likely to be obese or overweight. Evidence has been contradictory regarding the relationship of BMI and smoking in studies of adolescents.[36] In contrast to our findings, an analysis of the national YRBS data from 1999-2005 concluded that smoking was associated with a higher BMI in both boys and girls.[36] An increased prevalence of obesity or overweight among non-Hispanic black and Hispanic children of both genders has been well described in large national studies.[37,38] In our study population, after adjusting for other risk factors, non-Hispanic black girls were observed to be significantly more likely to be obese or overweight than non-Hispanic white girls, and Hispanic boys were

significantly more likely to be obese or overweight than non-Hispanic white boys. This supports the need for targeting intervention to these at-risk race/ethnicity groups.

Variables related to physical activity and diet were not shown to have predictive value for obesity or overweight in our study. Although a significant association was observed between having participated in physical activity for 60 minutes per day in 5 of the past 7 days and obesity or overweight in unadjusted analysis in girls, this did not persist after controlling for other factors in multivariate analysis. A significant association was also not seen between eating fruits and vegetables 5 or more times per day in the past 7 days and obesity or overweight. In theory, fruits and vegetables might serve as a substitute for less healthful, more energy-dense food. However, because overall caloric intake was not calculated in this survey, we cannot know how this compared between students who reported eating the recommended intake of fruits and vegetables and those who did not. A previously reported positive association between eating fruits and vegetables 5 or more times a day and obesity in boys (based on the 2001 national YRBS)[31] was not observed in the present study.

Survey results indicated that close to three-quarters of obese or overweight students were trying to lose weight. Although exercise and dieting were the most common weight control behaviors reported, an important finding is that obese or overweight students were significantly more likely to be employing unhealthy weight control behaviors than non-obese and non-overweight students. This included fasting for 24 hours, as well as taking laxatives, diet pills or vomiting. Obese or overweight students were also significantly more likely to report being harassed on school property because of their weight, size, or physical appearance in the past 12 months. Close to one-third of these students reported being targets of such harassment, revealing the widespread nature of this problem. These data underscore the need for efforts to stem the discrimination and stigmatization of obese adolescents, including bullying in school.[39,40]

A number of limitations to this study deserve mention. Because it is a cross-sectional survey, the temporal sequence of events cannot be known and a determination of causal associations cannot be made. Also, BMI was determined by self-report in this study instead of direct measurement. Self-report may lead to an underestimate of obesity and overweight,[41] although self-reported and measured weight and height have been found to be strongly correlated.[42] Another study limitation is the lack of information about students' socioeconomic status, which is a potential confounder in our study. The Connecticut YRBS is also administered to public school students only, so may not be generalizable to private school students or adolescents who have dropped out. A recent study based on data from the National Survey of Children's Health concluded that children attending US public schools were more likely to be overweight than those attending private schools.[43] However, the difference was small, with students attending public schools having a BMI that was 0.398 higher on average. Finally, obesity or overweight status was based on BMI, although this measure does not, in fact, distinguish between fat and lean body mass.

In summary, independent predictors of obesity or overweight in Connecticut high school students have been characterized in this study -- including those that are gender-specific. These factors can serve to identify at-risk students and potentially lead to more effective and informed intervention and prevention efforts that utilize available resources more efficiently. Gender differences related to obesity or overweight are important to identify and may lead to novel gender-focused interventions. In this regard, the associations observed in this study between obesity or overweight and suicidal ideation in girls, and poor academic performance in boys, seem particularly relevant and merit further investigation. Obese or overweight students were also significantly more likely than their peers to report the use of unhealthy weight control

practices and to report harassment on school property because of weight, size, or physical appearance. .

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Disclosure

The authors have no conflicts of interest to disclose.

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Table 1. Weight status and other characteristics of participants in the 2009 Connecticut School Health Survey, Youth Behavior Component*

Characteristic	N=2392	Weighted percent
Weight Status		
Non-obese, Non-overweight	1663	75.1
Overweight	325	14.5
Obese	238	10.4
Demographic and Background Information		
Gender		
Female	1249	49.1
Male	1136	50.9
Grade		
9th-10th	1442	52.4
11th-12th	913	47.6
Age		
14 years old or younger	378	13.3
15 years old	661	23.5
16 year old	593	24.5
17 years old	496	25.1
18 years old or older	262	13.6
Race/ethnicity		
White	1380	67.5
Black	312	13.8
Hispanic	493	14.9
Other	165	3.9
Grades		
Mostly A's or B's	1696	75.1
Mostly C's	452	19.8
Mostly D's or F's	126	5.1
Physical Activity and Sedentary Activity		
Physically active 60 minutes/day in 5 or more of past 7 days		
No	1299	54.8
Yes	1020	45.2
Watch 3 or more hours TV on average school day		
No	1594	69.8
Yes	706	30.2
Play video games or use computer (not for school work) 3 or more hours on average school day		
No	1648	72.1
Yes	667	27.9
Diet		
Ate fruits and vegetables 5 or more times per day during the past 7 days		
No	1796	79.0
Yes	478	21.0

Table 1 (Continued).

Characteristic	N=2392	Weighted percent
Tobacco Use		
Smoked cigarettes in past 30 days		
No	1978	82.2
Yes	399	17.8
Physical and Mental Health		
General Health		
Excellent or very good	1524	65.5
Good	660	27.1
Fair or poor	191	7.5
Seriously considered suicide in past 12 months		
No	2025	85.9
Yes	348	14.1
Family Interaction and Other Activities		
Ate meal with family in 3 or more of past 7 days		
No	845	36.3
Yes	1460	63.7
Took part in organized after-school, evening, or weekend activity 3 or more of past 7 days		
No	1297	56.1
Yes	1001	43.9
Get 6 or more hrs of sleep on an average school night		
No	471	20.4
Yes	1818	79.6

* Numbers may not sum to total due to missing data, and column percentages may not sum to 100% due to rounding.

Table 2. Bivariate associations between study variables (weight perception, weight management, bullying) and overweight status*

Characteristic	Obese or Overweight N=563	Non-Obese, Non-Overweight N=1663	p†
	N (weighted %)	N (weighted %)	
Describe your weight			<0.001
Very underweight	8 (1.7)	39 (2.3)	
Slightly underweight	17 (3.0)	234 (14.9)	
About the right weight	168 (29.4)	1154 (70.5)	
Slightly overweight	301 (55.5)	194 (11.6)	
Very overweight	58 (10.4)	10 (0.7)	
What are you trying to do about your weight			<0.001
Lose weight	405 (72.4)	631 (37.8)	
Gain weight	37 (7.5)	302 (19.0)	
Stay the same weight	56 (9.9)	377 (22.3)	
Not trying to do anything	56 (10.2)	331 (20.9)	
Exercised to lose weight or keep from gaining weight during the past 30 days			<0.001
Yes	429 (76.5)	935 (57.0)	
No	123 (23.5)	696 (43.0)	
Ate less food, fewer calories, or foods low in fat to lose weight or keep from gaining weight during the past 30 days			<0.001
Yes	278 (49.7)	590 (35.4)	
No	269 (50.3)	1040 (64.6)	
Fasted for 24 hours or more to lose weight or keep from gaining weight during the past 30 days			0.003
Yes	74 (13.3)	117 (6.9)	
No	477 (86.7)	1515 (93.1)	
Took laxatives, diet pills (without Dr's advice) or vomited to lose wt or keep from gaining wt in past 30 days			0.028
Yes	40 (6.7)	74 (4.4)	
No	503 (93.3)	1548 (95.6)	
Harassed on school property because of wt, size, or physical appearance in past 12 months			0.001
Yes	166 (29.5)	352 (19.9)	
No	394 (70.5)	1305 (80.1)	

* Numbers may not sum to totals due to missing data, and column percentages may not sum to 100% due to rounding.

† P-value for χ^2 test

Table 3. Bivariate and multivariate associations between study variables and overweight/obese: **Combined Male and Female**

Characteristic	N[†]	% Obese or Overweight	Unadjusted OR (95% CI)	Adjusted OR (95% CI) (N=1884)
Gender				
Female	1135	18.9	1.00	1.00
Male	1091	30.4	1.87 (1.52 - 2.31)***	2.52 (2.00 - 3.19)***
Grade				
9th-10th	1339	24.1	1.00	1.00
11th-12th	858	25.7	1.09 (0.91 - 1.29)	1.15 (0.94 - 1.41)
Race/ethnicity				
White	1318	22.5	1.00	1.00
Black	284	29.3	1.43 (1.01 - 2.02)*	1.39 (0.83 - 2.35)
Hispanic	442	33.3	1.72 (1.33 - 2.24)***	1.46 (1.12 - 1.91)**
Other	151	25.1	1.16 (0.73 - 1.85)	0.86 (0.52 - 1.41)
Grades in the past 12 months				
Mostly A's or B's	1601	22.1	1.00	1.00
Mostly C's	418	30.3	1.53 (1.08 - 2.18)*	1.30 (0.95 - 1.78)
Mostly D's or F's	110	37.5	2.11 (1.35 - 3.30)**	1.59 (0.94 - 2.69)
Physically active 60 minutes/day in 5 or more of past 7 days				
No	1183	25.4	1.00	1.00
Yes	979	24.4	0.94 (0.73 - 1.22)	1.07 (0.76 - 1.49)
Watch 3 or more hours TV on average school day				
No	1508	22.2	1.00	1.00
Yes	636	31.1	1.58 (1.23 - 2.04)**	1.43 (1.04 - 1.96)*
Play 3 or more hours video games or computer use (not for school work) on average school day				
No	1549	24.7	1.00	1.00
Yes	611	25.4	1.04 (0.80 - 1.34)	0.80 (0.61 - 1.05)
Ate fruits and vegetables 5 or more times per day during the past 7 days				
No	1684	25.4	1.00	1.00
Yes	441	23.7	0.91 (0.67 - 1.24)	1.06 (0.73 - 1.54)

Table 3 (Continued)

Characteristic	N[†]	% Obese or Overweight	Unadjusted OR (95% CI)	Adjusted OR (95% CI) (N=1884)
Smoked cigarettes in past 30 days				
No	1854	25.6	1.00	1.00
Yes	362	21.7	0.81 (0.58 - 1.11)	0.54 (0.36 - 0.80)**
General Health				
Excellent or very good	1427	19.3	1.00	1.00
Good	623	31.8	1.95 (1.57 - 2.43)***	2.00 (1.62 - 2.48)***
Fair or poor	164	49.7	4.13 (3.05 - 5.61)***	4.49 (3.26 - 6.19)***
Seriously considered suicide in past 12 months				
No	1900	24.3	1.00	1.00
Yes	313	30.1	1.35 (1.07 - 1.69)*	1.50 (1.07 - 2.09)*
Took part in organized after-school, evening, or weekend activity 3 or more of past 7 days				
No	1187	27.0	1.00	1.00
Yes	956	22.4	0.78 (0.65 - 0.95)*	0.93 (0.70 - 1.24)
Getting 6 or more hrs of sleep on an average school night				
No	428	28.8	1.00	1.00
Yes	1706	23.8	0.78 (0.58 - 1.03)	1.08 (0.75 - 1.57)
Ate meal with family in 3 or more of past 7 days				
No	773	25.2	1.00	1.00
Yes	1377	24.6	0.96 (0.76 - 1.23)	1.24 (0.96 - 1.62)

[†] Numbers may not sum to total due to missing data.
* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Table 4. Bivariate and multivariate associations between study variables and overweight/obese: **Female Only**

Characteristic	N[†]	% Obese or Overweight	Unadjusted OR (95% CI)	Adjusted OR (95% CI) (N=986)
Gender				
Female	------	------	------	------
Male	------	------	------	------
Grade				
9th-10th	687	18.1	1.00	1.00
11th-12th	438	19.6	1.11 (0.77 - 1.59)	1.35 (0.92 - 1.97)
Race/ethnicity				
White	663	15.6	1.00	1.00
Black	150	27.4	2.04 (1.34 - 3.12)**	2.14 (1.28 - 3.60)**
Hispanic	239	24.8	1.79 (1.14 - 2.80)*	1.56 (0.93 - 2.63)
Other	73	24.6	1.77 (1.03 - 3.03)*	1.12 (0.66 - 1.92)
Grades in the past 12 months				
Mostly A's or B's	862	17.0	1.00	1.00
Mostly C's	173	23.7	1.52 (0.93 - 2.48)	0.98 (0.57 - 1.69)
Mostly D's or F's	50	22.2	1.40 (0.60 - 3.24)	0.79 (0.28 - 2.17)
Physically active 60 minutes/day in 5 or more of past 7 days				
No	724	20.5	1.00	1.00
Yes	387	15.1	0.69 (0.50 - 0.96)*	0.95 (0.61 - 1.49)
Watch 3 or more hours TV on average school day				
No	787	17.1	1.00	1.00
Yes	314	21.8	1.35 (0.91 - 2.02)	0.98 (0.63 - 1.54)
Play 3 or more hours video games or computer use (not for school work) on average school day				
No	811	19.2	1.00	1.00
Yes	301	16.8	0.85 (0.58 - 1.24)	0.68 (0.44 - 1.06)
Ate fruits and vegetables 5 or more times per day during the past 7 days				
No	888	18.4	1.00	1.00
Yes	207	19.5	1.07 (0.74 - 1.56)	1.31 (0.80 - 2.16)

Table 4 (Continued)

Characteristic	N[†]	% Obese or Overweight	Unadjusted OR (95% CI)	Adjusted OR (95% CI) (N=986)
Smoked cigarettes in past 30 days				
No	956	19.8	1.00	1.00
Yes	177	14.7	0.70 (0.40 - 1.23)	0.43 (0.20 - 0.92)*
General Health				
Excellent or very good	668	13.2	1.00	1.00
Good	356	23.8	2.05 (1.45 - 2.91)***	2.11 (1.42 - 3.14)***
Fair or poor	104	39.6	4.31 (2.60 - 7.16)***	5.02 (2.94 - 8.58)***
Seriously considered suicide in past 12 months				
No	938	17.3	1.00	1.00
Yes	193	27.6	1.82 (1.33 - 2.50)***	2.38 (1.65 - 3.43)***
Took part in organized after-school, evening, or weekend activity 3 or more of past 7 days				
No	610	20.9	1.00	1.00
Yes	490	15.3	0.68 (0.53 - 0.88)**	0.82 (0.56 - 1.21)
Getting 6 or more hrs of sleep on an average school night				
No	228	22.1	1.00	1.00
Yes	869	17.2	0.73 (0.51 - 1.05)	1.07 (0.63 - 1.81)
Ate meal with family in 3 or more of past 7 days				
No	423	19.2	1.00	1.00
Yes	685	18.1	0.93 (0.63 - 1.37)	1.32 (0.86 - 2.02)

[†] Numbers may not sum to total due to missing data.
* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Table 5. Bivariate and multivariate associations between study variables and overweight/obese: **Male Only**

Characteristic	N[†]	% Obese or Overweight	Unadjusted OR (95% CI)	Adjusted OR (95% CI) (N=898)
Gender				
Female	------	------	------	------
Male	------	------	------	------
Grade				
9th-10th	652	29.7	1.00	1.00
11th-12th	420	31.3	1.08 (0.80 - 1.46)	1.07 (0.77 - 1.48)
Race/ethnicity				
White	655	28.6	1.00	1.00
Black	134	31.1	1.13 (0.70 - 1.81)	0.97 (0.50 - 1.88)
Hispanic	203	42.6	1.85 (1.32 - 2.61)**	1.49 (1.02 - 2.18)*
Other	78	25.6	0.86 (0.40 - 1.84)	0.62 (0.31 - 1.25)
Grades in the past 12 months				
Mostly A's or B's	739	27.4	1.00	1.00
Mostly C's	245	34.4	1.39 (0.95 - 2.04)	1.55 (1.12 - 2.15)*
Mostly D's or F's	60	48.7	2.52 (1.37 - 4.63)**	2.52 (1.16 - 5.47)*
Physically active 60 minutes/day in 5 or more of past 7 days				
No	459	32.4	1.00	1.00
Yes	592	29.7	0.88 (0.63 - 1.23)	1.16 (0.78 - 1.75)
Watch 3 or more hours TV on average school day				
No	721	27.1	1.00	1.00
Yes	322	39.1	1.73 (1.30 - 2.30)***	1.83 (1.29 - 2.59)**
Play 3 or more hours video games or computer use (not for school work) on average school day				
No	738	30.2	1.00	1.00
Yes	310	32.5	1.12 (0.80 - 1.55)	0.87 (0.58 - 1.31)
Ate fruits and vegetables 5 or more times per day during the past 7 days				
No	796	32.3	1.00	1.00
Yes	234	27.1	0.78 (0.53 - 1.14)	0.92 (0.61 - 1.41)

Table 5.(Continued)

Characteristic	N†	% Obese or Overweight	Unadjusted OR (95% CI)	Adjusted OR (95% CI) (N=898)
Smoked cigarettes in past 30 days				
No	898	31.1	1.00	1.00
Yes	185	27.5	0.84 (0.55 - 1.29)	0.57 (0.34 - 0.95)*
General Health				
Excellent or very good	759	24.1	1.00	1.00
Good	267	41.0	2.18 (1.61 - 2.97)***	2.01 (1.48 - 2.73)***
Fair or poor	60	64.7	5.77 (3.67 - 9.07)***	4.49 (2.47 - 8.17)***
Seriously considered suicide in past 12 months				
No	962	30.3	1.00	1.00
Yes	120	33.4	1.15 (0.72 - 1.84)	1.03 (0.54 - 1.98)
Took part in organized after-school, evening, or weekend activity 3 or more of past 7 days				
No	577	32.7	1.00	1.00
Yes	466	29.1	0.84 (0.66 - 1.07)	1.01 (0.71 - 1.44)
Getting 6 or more hrs of sleep on an average school night				
No	200	35.7	1.00	1.00
Yes	837	29.9	0.77 (0.52 - 1.13)	1.04 (0.63 - 1.70)
Ate meal with family in 3 or more of past 7 days				
No	350	31.7	1.00	1.00
Yes	692	30.3	0.94 (0.72 - 1.22)	1.14 (0.85 - 1.53)

† Numbers may not sum to total due to missing data.
* $p<0.05$; ** $p<0.01$; *** $p<0.001$