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Overweight, Obesity, Youth, and Health-Risk Behaviors

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Abstract

Background—The prevalence and severity of obesity have increased among children and adolescents. While the medical and psychosocial consequences of youth obesity have been well-documented, less information exists on the association of overweight/obesity with health risk behaviors, which are considered to be a primary threat to adolescent health.

Objectives—This study examined the association of overweight and obesity with health-risk behaviors among U.S. youth.

Methods—Self-reported height and weight, substance use, violence and bullying were assessed in a nationally representative sample of students aged 11 to 17 years (N=7825) who participated in the 2005/6 Health Behaviors in School-Aged Children survey. Data were analyzed in 2009.

Results—Significant gender and age differences in the relationship of overweight/obesity with risk behaviors were observed. Overweight and obesity were significantly associated with substance use among girls only: frequent smoking and drinking were associated with overweight and obesity among younger girls, whereas they were associated with obesity among older girls. Frequent smoking and cannabis use were associated with overweight among younger girls only. Relationships between violent behavior and overweight/obesity were mainly observed among boys: Younger obese boys were more likely to be victims of bullying, whereas older obese boys were more likely to carry weapons, compared to boys of normal weight.

Conclusions—Overweight and obese youth are at risk of developing health compromising behaviors which may compound medical and social problems associated with excess weight.

Introduction

Overweight and obesity in youth are a growing concern. The prevalence of overweight children and adolescents has tripled since 1980 and the severity of obesity has increased in the past 10 years.[1,2] Complications of youth overweight and obesity are well-documented and include metabolic health risk, chronic diseases, psychosocial problems,[3,4] and an increased risk of cardiovascular diseases in adulthood.[5,6]

However, less is known about the association of overweight/obesity with health risk behaviors, which are considered to be a primary threat to adolescent health.[2] Experimentation with health-compromising behaviors is common during adolescence, as youth's independence from

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parents, peer modeling, and access to potentially harmful substances increase.[7] Engaging in health-risk behaviors may be considered normative and serve a developmental purpose, such as rebellion against authority and identification with the youth subculture.[7] Health-risk behaviors may also help to cope with stressful life events.[7,8] For example, evidence shows that substance use may be greater among groups of individuals with chronic stressors, who would use substances as a coping mechanism.[7,9–12]

Overweight/obese adolescents are particularly vulnerable to risk behavior and are more likely to demonstrate maladaptive coping. Compared to their normal-weight peers, overweight/obese youth are more likely to experience impaired peer relationships, stigma, and weight bias.[3,4,9,13,14] These stressful life events, in combination with the normative challenges of adolescence and the stress of managing an unhealthy weight, may make adolescents more susceptible to engage in health-risk behaviors.[9]

Relatively few studies have explored the association between overweight/obesity and health-risk behaviors among adolescents. Studies that did have shown a positive association between BMI and smoking initiation,[15,16] binge drinking, alcohol, tobacco and other drug use,[17, 19] fighting and aggression,[19,20] and bullying.[18,21,22] Higher BMIs have also been linked to substance use and substance use disorders[18,23,24] and to aggressive behaviors[25] among adult samples. Further, behavioral risk factors for adolescent overweight/obesity (inadequate diet and physical activity, sedentary lifestyle) often co-occur[26,27]. The association of these obesity-related behavioral risk factors to substance use[28–31] suggests that overweight/obese adolescents may indeed be more vulnerable to health-risk behaviors than their normal-weight peers.

Studies that have examined the association of overweight/obesity with health-risk behaviors are limited by several factors. First, they included age as a covariate, rather than an effect modifier, or restricted the sample to specific subgroups. However, the relationship between overweight/obesity and risk behaviors may vary by age. Children have a lower tolerance for body size variations,[32] and as such, their overweight/obese peers are more likely to suffer from weight-related stigma and stress, which could lead to greater engagement in risk behaviors. Furthermore, no studies were identified which examine the association of overweight/obesity with risk behaviors in a nationally representative sample, thus limiting the generalizability of previous findings. It is also important to note that previous studies examined these relationships for one gender[18] or controlled for gender when using a sample of boys and girls.[19] However, evidence suggests that gender moderates the association of body weight with risk behaviors such as bullying[21] and smoking.[33] Finally, although greater deviations from normal weight are associated with greater discrimination,[34] and, potentially, with higher levels of engagement in risk behaviors, few studies have considered that risk behaviors may be differentially related to degree of overweight. Collectively, these findings suggest a need to further clarify the association between overweight/obesity and health-risk behaviors among youth.

The purposes of this study are therefore to examine the association between overweight/obesity and adolescent health-risk behaviors (*substance use*, *violence*, and *bullying*); and to determine whether this association varies by gender and age. Given that adverse psychological consequences associated with obesity, and weight stigma, are more pronounced for girls [13,14,35], it is hypothesized that there will be gender differences in these associations, and age differences, since tolerance for body-size variations increases with age.[32,36]

METHODS

Sample and Procedures

The U.S. 2005/6 Health Behavior in School-Aged Children (HBSC) study is a survey of a nationally representative, school-based sample conducted every 4 years. The survey is part of a collaboration with over 40 countries coordinated by the WHO. More information on methods and procedures can be found at www.hbsc.org.[37] A three-stage stratified clustered sampling, with classes as the sampling units, was used to select a nationally representative sample of students in grades 6 through 10 during the 2005/6 school year. African-American and Hispanic students were oversampled to provide better population estimates for these minorities. Data were collected through self-report questionnaires distributed in the classrooms; respondents' anonymity was ensured throughout the data collection. The IRB at the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development approved the 2005/6 survey. Of the students selected for the study, 85% (9,016) completed the questionnaire. Of the total sample, respondents who were aged <11 years and subjects who were underweight were excluded, because of insufficient numbers for meaningful analyses (3.743% and 0.074% of the total sample, respectively). The final sample included 7,825 students.

Measures

BMI measurement and obesity classification—BMI was computed from adolescents' self-reported height and weight, which studies have shown to be adequate estimates for actual height and weight.[38,39] BMI-for-age percentiles for each gender were derived using the CDC 2000 growth chart.[40] BMI-for-age weight status categories and the corresponding percentiles were as follows: adolescents were considered normal weight if their BMI was between the 5^{th} and the 85^{th} percentile; overweight if their BMI was between the 85^{th} and the 95^{th} percentile; and obese if their BMI was equal to or greater than the 95^{th} percentile.

Smoking, drinking, and cannabis use were measured by asking respondents how often they smoked, drank alcohol, or used cannabis in the 30 days preceding the survey. Response items ranged from "Never" to "40 times or more." Respondents who answered "Never" were considered "Abstainers;" those who reported "Once or twice" were considered "Experimenters;" all others were considered "Frequent users[41]."

Involvement in bullying was measured by two questions asking the frequency with which respondents bullied others or were bullied at school in the past couple of months. Response items ranged from "I haven't been bullied (or I haven't bullied another student) at school the past couple of months" to "several times a week." Respondents were categorized as "victims" if they reported only bullying victimization (at least 2 or 3 times a month); "perpetrators" if they reported only bullying perpetration (at least 2 or 3 times a month); "victim-perpetrators" if they reported both bullying victimization and perpetration; and "not involved" if they reported neither.

Respondents were asked how often they had been involved in a **physical fight** in the past 12 months, with response options ranging from "I have not been in a physical fight," to "4 times or more." This variable was dichotomized to compare respondents who were "not in fights/in one fight" to those who were in fights 2 or more times.

Respondents reported the frequency with which they **carried a weapon**, such as a gun, knife or club during the 30 days preceding the survey. This variable was dichotomized and respondents who reported "not carrying a weapon" were compared to those who carried a weapon on at least 1 day.

Demographic characteristics included gender, age (dichotomized as <15 years or ≥15 years because the prevalence of substance use becomes more substantial for 10th graders[42], whereas the prevalence of bullying/victimization is higher in middle school than in high school and decreases with age[43]), race/ethnicity (white/black/Hispanic/Other), family composition (one-parent/two-parent/other) and family affluence scale. Family affluence scale, an indicator of adolescents' SES, was constructed from questions about family wealth and categorized into tertiles. A review[37] indicated that the scale has good content and external validity.

Analysis

All analyses were conducted in 2009 using Stata 9 to adjust for the cluster-based sampling design of HBSC. Weights were applied to provide nationally representative estimates. Descriptive statistics were computed for all variables. Multinomial and logistic regression models, stratified by gender and age, were fitted to obtain adjusted estimates of the relative risk (RR) of substance use, violence and bullying in overweight and obese adolescents, compared to those with normal weight. Respondents' demographics were controlled for in the multivariable models. Models were stratified by gender and age, rather than including interaction terms, because the resulting large number of interaction terms, especially in models with a low prevalence for the outcome, would make for an overspecified model.

RESULTS

Sample

Approximately half of the sample were boys. Most respondents were non-Hispanic whites, lived in two-parent families, and were aged <15 years (Table 1). About two thirds of the total sample were of normal weight, 17.8% were overweight and 14.3% were obese.

Alcohol was the most prevalent substance used with one third of respondents reporting alcohol experimentation or frequent use, compared to about 14% for smoking and 9% for cannabis use. About two of every ten respondents were involved in bullying and a similar number reported engaging in physical fights twice or more in the past year, with more boys than girls reporting this behavior. Thirteen percent of adolescents reported carrying a weapon at least once in the past month. The prevalence of weapon carrying was about four times higher among boys than girls.

Bivariate Analyses

In unadjusted multinomial regressions, no substance use variable was significantly associated with overweight/obesity among boys. In contrast, smoking, drinking and cannabis use were significantly related to overweight and obesity among girls (Table 2). Compared to normal weight girls, obese girls had a higher RR of being frequent smokers, drinkers, and cannabis users. Overweight girls had a higher RR of drinking compared to normal-weight girls. Among boys, a significant association was observed among bullying, weapon carrying and overweight/obesity. Obese boys were more likely to be victims of bullying and to carry weapons. No significant associations were observed between overweight and any of these violent behavior variables.

Bullying and weapon carrying were also associated with weight status among girls. Compared to normal weight girls, overweight girls were more likely to be victims of bullying whereas obese girls were more likely to be victims and perpetrators. Overweight girls were also more likely to carry weapons.

Multivariate Regressions

Among control variables (results not shown), family affluence scale was negatively associated with frequent alcohol use and bullying/victimization (older boys), and frequent smoking, physical fighting and weapon use (older girls). Race/ethnicity was associated with experimental smoking, drinking and cannabis use (younger boys), bullying/victimization and physical fighting (younger girls).

In adjusted multinomial regressions, no significant relationships among substance use, physical fighting, and overweight/obesity were noted among boys (Table 3). However, younger obese boys had a higher RR of being a victim of bullying compared to younger boys of normal weight. Older obese boys had a higher RR of carrying weapons compared to older boys of normal weight.

No relationship between substance use experimentation and overweight/obesity were observed among girls (Table 4). However, frequent use of substances was related to weight status, and the relationship varied by age. Among younger girls, those who were overweight had a higher RR of being frequent smokers and drinkers, and those who were obese had a higher relative risk of being frequent smokers. However, among older girls, only those who were obese had a higher RR of being frequent smokers and drinkers.

Obesity was associated with cannabis use among younger girls only: their relative risk of being frequent users of cannabis was more than three times that of younger girls of normal weight. Finally, older obese girls had a lower RR of being victims/perpetrators of bullying, as compared to girls of normal weight.

DISCUSSION

This first study examining the relationship between overweight/obesity and health-risk behaviors in a nationally representative sample of adolescents indicated significant gender- and age-specific differences in this relationship. Substance use experimentation was not associated with overweight/obesity in any gender or age group, while frequent use of substances was significantly related to overweight/obesity among girls only. Overweight/obesity was associated with violent behavior mainly among boys. These observations highlight the increased vulnerability of overweight/obese girls to frequent substance use, and that of overweight/obese boys to violent behavior.

The gender differences observed may reflect gender differences in exposure to stress and in coping with stress among adolescents.[8,44] Studies have shown that overweight/obese girls are more subject to weight discrimination than overweight/obese boys. Puhl and colleagues[34] report that the rates of weight discrimination in American society are close to or sometimes higher than reported rates of racial discrimination, particularly among women. Obese women are at an especially increased risk of weight discrimination, with three times the risk of being discriminated against compared to male peers of a similar weight.[34] Gender differences in discrimination against obese individuals are similarly observed among youth, with girls more likely than boys to discriminate against obese peers.[35] Furthermore, girls are more likely than boys to smoke, drink, and use drugs when they are overly concerned with peer approval.[45]

The adverse effects of the disproportionate levels of overweight/obesity-related stigma that girls experience are compounded by the riskier behaviors that girls use to deal with stress. Suris[46] noted that, among girls, those with chronic conditions showed higher rates of substance use (cigarette, alcohol, illicit drug use) than those with no chronic conditions, whereas among boys, those with chronic conditions showed slightly lower rates of substance use than those

without chronic conditions. Girls experiencing stressful situations have also been noted to smoke[9], drink[8,9] and use marijuana.[8]

The higher likelihood of substance use among overweight/obese girls could also be due to negative peer- and school-related events.[9] Adolescents generally consider substance use as normative and perceive that most of their peers use drugs. Perceived peer use is positively linked to adolescent's own use. In their eagerness to be "normal" and blend in with their peers, overweight and obese girls are likely to engage in high rates of substance use.[46]

This study also points to gender differences in the association of overweight/obesity with aggressive behaviors. Compared to their normal weight peers, the higher risk of younger obese boys of being victims of bullying mirrors findings from previous studies.[21,22] The association of overweight/obesity with bullying victimization could result from impaired peer relationships and weight bias.[21] The observed gender differences in aggressive behavior associated with overweight/obesity are in line with previous research showing that boys are more likely to exhibit externalizing problem behaviors than girls.[47]

The age differences in the association of overweight/obesity with substance use among girls, and with bullying among boys, may reflect developmental variations in overweight/obesity-related stigma. For both genders, risk behavior was associated with overweight and obesity among younger adolescents, whereas it was associated with obesity among older adolescents. These findings suggest that greater deviations from normal weight are related to more risk behaviors, possibly because of more experiences with stress and stigma.[34] Indeed, studies have shown that younger individuals are less accepting of overweight/obese peers than older ones.[32,48] As such, even slight deviations from ideal body size, such as overweight, are likely to trigger discrimination and weight bias from young adolescent peers. However, among older adolescents, obesity, which represents a greater deviation from normality, would elicit discrimination and increased involvement in risk behaviors. Previous studies have shown that obesity was associated with more negative outcomes than overweight,[18,21,22,49] thereby confirming that level of adiposity and deviation from appearance ideals were significant factors in the relationship of overweight/obesity with risk behaviors.

The significant associations among family affluence scale, race/ethnicity and health-risk behaviors, as well as previously documented associations between these sociodemographic characteristics and overweight/obesity[1,50] suggest that SES and race/ethnicity could be potential moderators of the weight status/risk-behaviors association. Future studies are needed to examine these important subgroup differences.

This study has many strengths, including the use of a nationally representative sample of U.S. adolescents to examine relationships that were previously seldom tested, the investigation of age differences in the relationship between overweight/obesity and health-risk behaviors, and the examination of the moderating role of gender in these associations. Furthermore, the use of a population-based sample of youth with varying degrees of overweight enabled the examination of the association of weight status with risk behaviors across different subgroups, rather than focusing only on clinical samples with the most extreme cases of obesity.

However, several limitations should be considered. One important limitation lies in the cross-sectional nature of the data, which makes it difficult to test for the temporal sequence of these events. While these analyses examined the association between weight status and risk behaviors, with overweight/obesity leading to substance use, bullying and violence, it is possible that adolescents who engage in risk behaviors also engage in unhealthy eating practices that could ultimately lead to weight gain. Both pathways have supporting theoretic evidence, and future longitudinal studies are needed to disentangle causality. Another limitation is the study's reliance on subjective measures of height and weight to compute the

BMI score. Although these measures are adequate estimates of actual height and weight,[38] objective measurements would provide a stronger argument for these relationships.

This study has important implications. The association of overweight/obesity with substance use among girls, and with violent behavior among boys, suggests that overweight/obese adolescents face similar challenges as their normal-weight peers. However, an increase in substance use and violent behavior among overweight/obese adolescents may also be associated with social and psychological issues, and compound already existing problems associated with excess weight. Early intervention may be warranted to protect overweight/obese adolescents from developing not only medically and socially negative health outcomes, but also health-compromising behaviors as well. Overweight/obese adolescents, especially younger ones, could benefit from preventive counseling and health-risk screening during their routine healthcare visits.

Future research should also investigate mechanisms that could further our understanding of the differential association of overweight/obesity with health-risk behaviors. For example, do overweight boys and girls react to stigma and compensate differently than their obese peers? How does the relationship between overweight/obesity and health-risk behaviors develop over time? What comes first, obesity-related lifestyle factors such as inadequate diet and physical activity, or health-risk behaviors? Are these associations moderated by individual characteristics such as race/ethnicity, SES and geographic location? As an increasing number of adolescents are affected by the obesity epidemic, the benefit of this research may be seen in the reduction of adolescent behaviors that put them at additional risk of morbidity and mortality.

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Table 1

Respondents' sociodemographic characteristics, substance use, violence and bullying behaviors (number of observations and weighted percentages)

	Total (N=7825)	Boys (*n*=3801)		Girls (*n*=4024)	
	***n* (%)**	**Aged <15 years (63.67%)**	**Aged ≥15 years (36.33%)**	**Aged <15 years (65.68%)**	**Aged ≥15 years (34.32%)**
Race/Ethnicity					
White	3519 (41.89)	1124 (42.33)	588 (44.50)	1253 (41.7)	529 (39.97)
Black	1573 (19.18)	472 (18.03)	249 (20.36)	571 (17.57)	252 (22.08)
Hispanic	1869 (26.26)	655 (26.9)	223 (23.04)	728 (27.44)	239 (26.07)
Other	839 (12.68)	295 (12.74)	121 (12.10)	317 (13.29)	96 (11.88)
Family composition					
One parent	2036 (25.92)	653 (26.31)	282 (23.68)	768 (26.53)	304 (25.90)
Two parents	5414 (69.50)	1792 (69.72)	834 (71.38)	1985 (69.45)	756 (68.23)
Other	375 (4.58)	115 (3.97)	66 (4.94)	123 (4.01)	59 (5.87)
Family affluence					
Low	2014 (26.37)	600 (24.82)	317 (27.06)	737 (24.43)	335 (32.02)
Medium	3848 (48.87)	1290 (49.75)	566 (49.05)	1403 (49.4)	539 (45.44)
High	1920 (24.76)	651 (25.44)	291 (23.89)	725 (26.17)	241 (22.54)
Weight status					
Normal	1635 (67.93)	1635 (63.95)	791 (65.82)	2034 (71.28)	802 (71.47)
Overweight	492 (17.80)	492 (20.70)	189 (16.67)	477 (16.24)	185 (17.25)
Obese	433 (14.27)	433 (15.36)	202 (17.51)	365 (12.47)	132 (11.28)
Smoking (past 30 days)					
Abstainers	6503 (86.03)	2201 (89.72)	912 (81.46)	2485 (89.19)	847 (79.62)
Experimenters	468 (5.96)	114 (4.69)	87 (6.68)	151 (5.12)	108 (8.97)
Frequent users	626 (7.98)	144 (5.59)	148 (11.86)	167 (5.69)	147 (11.41)
Drinking (past 30 days)					
Abstainers	5210 (66.58)	1903 (75.82)	612 (54.88)	2099 (72.89)	558 (51.75)
Experimenters	1227 (17.39)	312 (14.15)	237 (19.90)	389 (14.50)	267 (25.43)
Frequent users	1142 (16.03)	238 (10.02)	296 (25.22)	309 (12.61)	273(22.82)
Cannabis use (past 30 days)					
Abstainers	6861 (90.75)	2292 (95.22)	930 (81.18)	2651 (95.20)	927 (85.47)

	Total (N=7825)	Boys (*n*=3801)		Girls (*n*=4024)	
	***n* (%)**	**Aged <15 years (63.67%)**	**Aged ≥15 years (36.33%)**	**Aged <15 years (65.68%)**	**Aged ≥15 years (34.32%)**
Experimenters	260 (3.84)	42 (1.35)	71 (6.85)	67 (2.60)	71 (7.37)
Frequent users	386 (5.41)	87 (3.43)	134 (11.96)	61 (2.19)	89 (7.16)
Bullying (past 2 months)					
None	6125 (82.12)	1875 (79.04)	920 (81.82)	2303 (82.38)	957 (87.01)
Victims	627 (7.39)	257 (8.81)	67 (5.29)	239 (7.90)	58 (6.01)
Perpetrators	610 (8.36)	225 (9.43)	125 (10.53)	185 (7.56)	70 (6.04)
Victims/perpetrators	188 (2.13)	82 (2.72)	33 (2.37)	63 (2.13)	9 (.94)
Physical fights (past year)					
Never/once	6103 (81.35)	1777 (73.77)	868 (76.40)	2454 (88.57)	941 (86.16)
Twice or more	1504 (18.65)	686 (26.23)	283 (23.60)	353 (11.43)	160 (13.84)
Weapon carrying (past month)					
Never	4977 (86.78)	1236 (80.99)	870 (77.9)	1805 (94.69)	1012 (92.20)
Once or more	851 (13.22)	344 (19.01)	273 (22.1)	125 (5.31)	88 (7.80)

Table 2

Unadjusted relative risk ratios for the relationship between weight status[a] and risk behaviors.

	Boys—RRR (95% CI)		Girls—RRR (95% CI)	
	Overweight	**Obese**	**Overweight**	**Obese**
Smoking				
Experimenters	.90(.53, 1.52)	1.14(.72, 1.82)	1.28(.85, 1.93)	1.21(.80, 1.85)
Frequent users	1.44(.96, 2.16)	.95(6 .64, 1.42)	1.45(.98, 2.13)	**2.35(1.68, 3.27)** ***
Drinking				
Experimenters	1.00 (.73, 1.36)	.72(.48, 1.07)	1.11(.83, 1.48)	1.15(.84, 1.58)
Frequent users	.93(.67, 1.29)	.96(.67, 1.39)	**1.35(1.02, 1.80)***	**1.39(1.05, 1.84)***
Cannabis use				
Experimenters	.97(.53, 1.78)	1.03(.40, 2.63)	1.40(.78, 2.52)	1.43(.79, 2.58)
Frequent users	.86(.49, 1.53)	.89(.59, 1.36)	.92(.54, 1.56)	**2.24(1.36, 3.69)****
Bullying				
Victim	1.06(.66, 1.68)	**1.60(1.15, 2.23)****	**1.49(1.00, 2.21)***	**1.68(1.07, 2.65)***
Perpetrator	.98(.65, 1.51)	1.08 (.70, 1.66)	1.47(.97, 2.22)	**1.56(1.00, 2.44)***
Victim/Perpetrator	1.09(.62, 1.90)	1.11(.56, 2.19)	1.47(.48, 4.48)	.97(.44, 2.15)
Physical fighting				
Twice or more[b]	.98(.73, 1.31)	1.20(.89, 1.61)	1.36(.99, 1.88)	1.51(.99, 2.31)
Weapon carrying				
Once or more[b]	1.21(.91, 1.60)	**1.65(1.17, 2.33)****	**1.95(1.15, 3.30)***	1.64(.94, 2.88)

[a] Normal weight and abstainers are the referent groups

[b] ORs, rather than risk ratios, displayed for the last two variables

*** p<.001

** p<.01

* p<.05

RRR,

Table 3

Adjusted relative risk ratios for the relationship between weight status[a] and risk behaviors (boys).[b]

	Boys aged <15 years RRR (95% CI)		Boys aged ≥15 years RRR (95% CI)	
	Overweight	**Obese**	**Overweight**	**Obese**
Smoking				
Experimenters	.94(0.46, 1.93)	.98(.52, 1.82)	.75 (.30, 1.83)	1.20 (.61, 2.36)
Frequent users	1.36(0.79, 2.37)	.71(.39, 1.31)	1.76(.98, 3.17)	1.09(.65, 1.81)
Drinking				
Experimenters	1.13(.71, 1.81)	.67(.40, 1.12)	.91(.56, 1.48)	.82 (.44, 1.56)
Frequent users	1.08(.70, 1.65)	.87(.55, 1.35)	.86(.52, 1.44)	.99 (.58, 1.70)
Cannabis use				
Experimenters	.85(.36, 2.04)	.74(0.27, 2.00)	1.23(.57, 2.65)	1.06 (.35, 3.24)
Frequent users	.72(.35, 1.48)	.78(0.40, 1.45)	1.07(.47, 2.41)	.75 (.41, 1.36)
Bullying				
Victim	1.16(.70, 1.91)	**1.67(1.11, 2.53)***	.64(.20, 2.01)	1.51 (.82, 2.78)
Perpetrator	.82(.48, 1.42)	.76(.40, 1.44)	1.33(.60, 2.94)	1.78 (.98, 3.26)
Victim/Perpetrator	.89(.39, 2.03)	1.03(.53, 2.03)	1.21 (.43, 3.38)	1.09(.29, 4.08)
Physical fighting				
Twice or more[c]	.94(.68, 1.28)	.94(.63, 1.40)	.97(.60, 1.58)	1.60(1.09, 2.35)
Weapon carrying				
Once or more[c]	.94(.61, 1.43)	1.21(0.72, 2.04)	1.72(.99, 2.97)	**2.16 (1.31, 3.56)****

[a] Normal weight and abstainers are the referent groups

[b] Models control for SES, race and family composition

[c] ORs, rather than risk ratios, displayed for the last two variables

*** p<.001

** p<.01

* p<.05

Table 4

Adjusted relative risk ratios for the relationship between weight status[a] and risk behaviors (girls).[b]

	Girls aged <15 years RRR (95% CI)		Girls aged ≥15 years RRR (95% CI)	
	Overweight	**Obese**	**Overweight**	**Obese**
Smoking				
Experimenters	1.26(.72, 2.19)	1.34(.70, 2.57)*	1.18(.72, 1.94)	.97(.43, 2.15)
Frequent users	**1.75(1.06, 2.90)***	**1.77(1.09, 2.86)***	1.07(.54, 2.13)	**2.05(1.25, 3.36)****
Drinking				
Experimenters	.92(.62, 1.36)	1.18(.80, 1.75)	1.34(.93, 1.93)	1.32(.77, 2.27)
Frequent users	**1.56(1.06, 2.29)***	1.11(.68, 1.82)	1.19 (.68, 2.07)	**1.81(1.17, 2.79)****
Cannabis use				
Experimenters	.87(.38, 2.00)	1.59(.81, 3.12)	1.61(.81, 3.21)	1.14(.51, 2.51)
Frequent users	.85(.40, 1.79)	**3.40(1.81, 6.33)*****	.85(.41, 1.78)	.97(.43, 2.19)
Bullying				
Victim	1.35(.90, 2.03)	1.40(.85, 2.31)	1.64(.62, 4.34)	2.07(.68, 6.33)
Perpetrator	1.22(.69, 2.18)	1.42(.84, 2.38)	2.00(.86, 4.68)	1.94(.86, 4.40)
Victim/Perpetrator	1.74(.55, 5.55)	1.19(.55, 2.60)	.40(.04, 3.76)	**.03(.00, .32)****
Physical fighting				
Twice or more[c]	1.37(.90, 2.10)	1.55(.95, 2.54)	1.06(.63, 1.76)	1.18(.57, 2.46)
Weapon carrying				
Once or more[c]	1.74(.81, 3.73)	1.22(.70, 2.14)	1.79(.93, 3.47)	1.72(.73, 4.05)

[a] Normal weight and abstainers are the referent groups

[b] Models control for SES, race and family composition

[c] ORs, rather than risk ratios, displayed for the last two variables

*** p<.001

** p<.01

* p<.05