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Overweight and School: Are There Any Perceived Achievement Consequences of Overweight Among American Youth?

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Abstract: In an effort to address the issue of overweight among youth, there is a growing body of research concerning the procurement food, the consequences of ingesting it and knowledge of the cultural cuisine rules (such as American cuisine may include hot dogs, hamburgers, fries and apple pie). However, there are few studies that examine the relationships between overweight and academic performance among adolescents. Based on the data collected by the World Health Organization in 1998, this study analyzed the relationships between overweight and student perceived academic performance for 15,686 children who were 10 to 15 years old. The results indicated that reported overweight was not statistically significantly related to perceived academic performance for these adolescents, while controlling for parental education level, gender, age, ethnicity, body image and other school-related variables. However, adolescents who were overweight were more likely to report that students were less friendly than those who were not overweight.

Key words: Perceived academic performance, overweight, adolescents overweight

INTRODUCTION

Since the 1960s the National Center for Health and Statistics of the Centers for Disease Control and Prevention has shown a consistent increase in obesity among all age groups of children and adolescents, both males and females[1]. In an effort to address the issue of obesity among youth, concerns about the kinds and quantities of foods consumed by America's youth have taken a prominent position in discussions across the country. Lifestyles (active or sedentary), diets and even genetics have all come under intense scrutiny to ascertain why today's youth are more overweight than ever before[2-4].

Just as important as understanding the factors that influence obesity is understanding obesity's effects on individuals – physiologically and sociologically. Research abounds showing the health hazards posed by overweight and obesity. Studies have shown that obesity contributes to heart disease and high cholesterol[2,5,6]. Childhood obesity has been shown to increase the risk of non-insulin-dependent diabetes[7,8] and overweight and obesity in adolescence greatly increase the risk of overweight and obesity in adulthood[9-11]. Although this short list of physiological concerns and studies is neither extensive nor exhaustive, it highlights the negative consequences of obesity in adolescents.

Similarly, the sociological effects of obesity on children and adolescents can manifest themselves in multiple ways, both interpersonally and academically. Relative to their non-obese peers, obese children are more likely to have difficulties in social settings[12-14]. As early as preschool, children have begun to show signs that they negatively rate overweight children[14]. In a study of second- to fifth-grade children, Strauss and colleagues found that obese children were viewed as having "more conduct problems, were nominated as least liked and received lower ratings by peers and perceived themselves as being more depressed, having a lower overall self-concept and having a lower self-concept concerning physical appearance"[13]. In this same study, obese children had as many close friends as non-obese children, but they were disliked more often outside their circle of friends. These social troubles can become worse in adolescence. Werkman and Greenberg noted that obese teenagers can be ostracized by their peers, which often leads to higher absenteeism[15]. This factor may contribute to Mayer's conclusion that obese adolescents are more socially anxious and passive than their normal weight peers[16].

Overweight students may find that their troubles extend into their academic lives as well. Baum and Forehand[12] and Ruston[17] found that self-esteem, body image and personal adjustment are related to academic achievement. Hendry and Gillies found overweight students to be both socially and educationally disadvantaged[18]. Teacher perception consistently rated overweight students below their normal weight counterparts, both physically and socially. Obese girls, especially, had more trouble than their non-obese counterparts of being admitted to the college of their choice, even though their aptitude tests and other aspects of their college admissions materials were similar[19]. A more recent study indicated that both obese boys and girls were more likely to view

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themselves as poor students and had more school problems[20].

However, not all studies reported a significantly negative association between obesity and academic achievement. For example, Freeman studied the effects of subjective obesity on academic achievement in 214 Canadian students in grades 4 to 6. Students took standardized tests in reading, self-concept and self-esteem[21]. These were used along with the students' height-weight measurements to ascertain the relationship between obesity and academic achievement. Freeman found no statistically significant relationship between students' objectively measured obesity and their scores on the standardized reading test. This held true for the whole sample, for both sexes, for all grades and for each grade-sex combination. Nor did he find a significant correlation between subjective obesity and academic achievement for the total sample, for all boys or all girls, or for grades 4 or 5 (boys, girls, or both sexes together).

Similarly, Datar, Sturm and Magnabosco analyzed data from the Early Childhood Longitudinal Study – Kindergarten Class (ECLS-K)[22]. During the 1998-1999 school year, the ECLS-K surveyed a nationally representative cohort of kindergarteners in the US. Data was collected in fall and spring of kindergarten and again in fall and spring of grade 1. After controlling for socioeconomic, ethnic and behavioral factors, Datar *et al.* did not find a significant difference in math and reading test scores between overweight and non-overweight children except for the boys' math scores at fall of kindergarten. Indeed, in a study done by Mo-suwan, Lebel, Puetpaiboon and Junjana on a group of Thai school children using the First National Health and Nutritional Examination Survey (NHANES-I) from the Centers for Disease Control, the results indicated that, in spite of the cultural differences, there was no significant correlation between grade point average (GPA) and body-mass index (BMI) for grades 3–6[23]. They did, however, find a significant correlation between GPA and BMI for grades 7–9, even after they statistically controlled for gender, age group, school and grade. Obese students in those grades had a GPA that was 0.48 point lower (on a 4.0 scale) than the GPA of their non-obese counterparts.

Thus, there is some uncertainty regarding the effect of overweight on student academic achievement (measured either objectively or subjectively). Freeman suggested that the academic impacts of obesity do not start to manifest themselves until the pre-teen or adolescent years[21]. To our knowledge, there are few empirical studies that examine the association between perceived academic performance and overweight during adolescence using nationally representative data. Datar *et al.* examined this issue using data on kindergarteners (and first graders) in the US[22]. Li studied overweight and IQ using data on primary school children in China[24]. A study by Mo-Suwan *et al.* was the only study that used data on pre-teens (grades 3 to 6) and adolescents (grades 7 to 9) in Thailand[23].

Based on the findings from previous studies, it is reasonable to expect that overweight has negative consequences on students' academic performance, especially for adolescents. However, the results from previous studies have limitations in this regard. Such limitations include studies' small sample sizes or populations that focused more on children and may not be representative of the adolescent population. In the US few empirical studies have been done to further examine the issue of overweight and academic performance, even though there has been a great concern over obesity among adolescents. The present study intends to examine the relationship between overweight and academic achievement. To the best of our knowledge, the evidence is less conclusive as it pertains to the direct effect of overweight on academic achievement and to date, only a few studies have investigated the association between achievement and overweight, especially from the students' perspective.

The theoretical framework for our study was based on the appearance theory which stated that appearance traits influence the opinions of other people, which in turn impact one's perceptions about self[25]. For example, if a good-looking student were perceived as smart, he/she would be more likely to behave in a way that conforms to that opinion. Conversely, if overweight adolescents were stigmatized as being lazy and dumb, they may conform to that stigmatized opinion and behaved accordingly. From this perspective, we hypothesize that students who are overweight (as determined by BMI percentiles for females and males of each grade level) are more likely to report lower perceived school performance than their counterparts after controlling for some major confounding factors. The confounding effects include socioeconomic status (SES), age, body image, gender, ethnicity and other school-related variables such as school dislike, parental involvement in school, negative school environment, teacher caring, student friendliness and school expectations from parents and teachers. We include these control variables in our study because these variables have been found to be associated with student perceived school performance[26]. By statistically partialling out their effects, we may rule out these confounding factors in our analysis.

In addition to test the stated hypothesis, we also intend to replicate findings that indicated the sociological consequences of overweight[20], using the large national representative sample of adolescents. Particularly, we expect that students who were overweight tended to report less positive student and teacher interactions in the school setting.

MATERIALS AND METHODS

Sample: This study used the data collected by the World Health Organization from the survey called Health Behavior of School-Aged Children (HBSC). The survey participants were drawn from a nationally representative sample of US youth in grades 6 through

10 during spring of 1998 and it was part of a collaborative, cross-national research project coordinated by the World Health Organization[27]. The US sampling universe for the HBSC consisted of public, Catholic and other private school students in the 50 states and the District of Columbia. Students were in grades six, seven, eight, nine and ten, or their equivalents. Very small schools, those with enrollments of less than 14 (comprising about 1% of the enrollment of U.S. schools), were excluded from the data. The study employed a three-stage cluster design in which the school's county was the primary sampling unit (PSU) or first stage (sometimes smaller counties were combined as a single PSU), the school was the second stage and the classroom was the third stage. The sample was also stratified by racial/ethnic status (over-sampling for black and Hispanic students required us to provide separate estimates for minority students), geographic region and metropolitan statistical area status (largest urban areas/not largest urban areas). Sampling weight was used to correct the over-sampling of minority students.

In the US sample, the number of students who participated was 17,000, yielding a response rate of 83%. These participation rates were sufficient to achieve the targeted precision levels and confidence intervals for the sub-populations of interest. The sample excluded the following students: (1) students who were from more than one grade or out of range for the targeted population; (2) students whose ages were extreme for their grade, or their grades or ages were unknown. Thus, the final study sample included 15,686 students (8,370 females and 7,316 males). The demographic characteristics of the sample are shown in Table 1.

Procedures: The HBSC survey was conducted in school settings and was administered to participating students by a school representative (for example, teacher, nurse, guidance counselor and the like). The school representatives read scripts that explained the survey procedures. Students completed a self-report questionnaire in a regular classroom setting. The questionnaire included demographic information and the measures that were concerned with specific health behaviors. The questionnaire took approximately 45 minutes to complete.

Measures: Items used in the HBSC survey were used as the basis for measures in the analyses. In this study, the primary measures relevant to the research hypothesis include the following:

* Perceived achievement level: Students' perceptions of their levels of achievement were measured by asking students "What does your class teacher(s) think about your school performance compared to your classmates?" The students' responses were recorded on a 4-point Likert scale, with 1 indicating *below average* and 4 indicating *very good*. Thus, a high score indicated that teachers perceived a student as performing very well in comparison with others.
* Overweight index: The overweight index for the adolescents was defined by using BMI percentiles for males and females of each grade level. Adolescent overweight was based on age- and gender-specific growth charts published by the Centers for Disease Control and Prevention. Overweight was determined as at or above the 95th percentile. In the current sample, 13% of the students (n = 1964) in the sample were considered overweight as measured in this way.

Table 1: Demographic characteristics of the sample

	Female		Male	
	N	%	N	%
Total	8370	53	7316	47
Ethnic				
Hispanic	851	10	643	9
Native American	240	3	221	3
Asian American/Pacific Islander	412	5	476	7
African American	1555	19	1170	16
White	5219	63	4749	65
Grade				
6th grade	1498	18	1461	20
7th grade	1445	17	1229	17
8th grade	1820	22	1596	22
9th grade	1903	23	1553	21
10th grade	1628	20	1413	19
Parental Education Level				
Low education	1341	16	807	11
Middle-low education	2184	26	1791	25
Middle education	1678	20	1314	18
Middle-high education	2282	27	2457	34
Unknown education	851	10	918	13
Residence location				
Urban area	2148	26	1621	22
Suburban	2413	29	2367	33
Town	2308	28	2043	28
Rural area	1354	16	1200	17
Weight Status				
Overweight	934	11	1030	14
Not overweight	7436	89	6286	86

For examining the first hypothesis, the following measures were employed as control variables:

* Body image: Two items were used as measures of adolescent body image. The first item was "Is there anything about your body you would like to change?" The students responded to the item with a Yes or a No. The second question asked the students how they perceived themselves: *very good looking* (=1), *quite good looking* (=2), *about average* (=3), *not very good looking* (=4) and *not at all good looking* (=5).
* Parental education level: Two survey items were available from the data to characterize the socioeconomic status (SES) of the students' families. The students were asked to respond to the questions "What is your mother's/father's highest level of education?" Response options ranged

from 1 (*did not finish high school*) to 5 (*graduated from college*). The parental education level was calculated as the average of the educational level of the student's mother and father.

* School dislike: An index of the respondents' dislike for school was created from three items measuring the respondents' negative feelings about or behaviors toward their schools. The first item asked "How do you feel about school at present?," with 1 indicating *I like it a lot* to 4 indicating *I don't like it at all.* The second item asked "How many days did you skip classes or school this term?" with response options that ranged from one (*0 days*) to five (*4 or more days*). The last item asked "How often do you think that going to school is boring?" with response options that ranged from one (*never*) to five (*very often*). The index was calculated by averaging participants' responses to these items, with a high score indicating a higher degree of dislike. The reliability of this index, as measured by Cronbach's alpha, was .63.
* Negative school environment: Five items were used to measure students' perceptions of the school environment. Examples of these items included "In our school the students take part in making rules" and "Our school is a nice place to be." The five response options ranged from *strongly agree* to *strongly disagree*. The items were coded so that a higher score was associated with a less positive evaluation of the school environment. The reliability of these items was .65. The final index was made up of the average of these items, which therefore retained their original range from one to five.
* Teacher caring: Four items assessed students' perceptions of how much their teachers cared for their students: "I am encouraged to express my views in my class(es)," "When I need extra help, I can get it," "My teachers are interested in me as a person," and "Our teachers rate us fairly." The participants responded on a five-point Likert scale that ranged from *strongly agree* to *strongly disagree*. The items were re-coded so that a high score indicated a higher degree of perceived teacher caring. The reliability of the items was .78.
* Student friendliness: Three items were used to assess respondents' perceptions of the friendliness of the students in their school: "The students in my class(es) enjoy being together," "Most of the students in my class(es) are kind and helpful," and "Other students accept me as I am." The participants responded on a five-point Likert scale that ranged from *never* to *always*. The scale was coded so that a higher score indicated a higher degree of perceived friendliness. The reliability of the scale was .72.
* Parent/teacher expectation: Students' perceptions of their parents' and teachers' expectations were measured through two items: "My parents expect too much of me at school" and "My teachers expect too much of me at school." The participants' responses were recorded on a five-point Likert scale that ranged from *strongly disagree* to *strongly agree*. The scale was scored so that a high score indicated a stronger perception that parents and teachers expected too much of them. The reliability of this scale was .70.

In addition, the gender, grade level/age and ethnicity (white, black, Asian, Hispanic, native American and other Pacific Islander) were also used as control variables in the analyses.

Data analysis: The data analysis methods used to examine the research hypotheses were survey regression analyses. Sample weight was used to adjust for the minority over-sampling and to obtain student totals by grade comparable to population grade estimates from the US National Center for Education Statistics. Weighted data analyses were conducted using the SurveyReg procedure in SAS. This procedure can handle complex survey sample designs, including designs with stratification, clustering and unequal weighting. To estimate the variance-covariance matrix for the regression coefficients, the procedure uses the Taylor expansion theory for estimating sampling errors of estimators based on complex sample designs[28-30].

In order to examine the first hypothesis, which investigated the relationship between overweight and perceived school performance while taking into consideration gender, ethnicity and other school-related variables, regression analysis was carried out in which achievement level was used as the dependent variable and overweight was used as the independent variable. Body image, ethnicity, parental education level, parental school involvement, expectations from parents and teacher, school dislike, negative school environment, teacher caring and student friendliness were used as covariates. The regression analysis was performed separately by gender as well as by grade level so that we could obtain a detailed picture of the association between achievement and overweight.

In examining the second hypothesis, which focused on the social consequences in the school setting due to overweight, we performed two regression analyses in which the dependent variable was student friendliness in one analysis and teacher caring in a second. In both analyses, the independent variable was overweight, with body image, ethnicity, parental education level, parental school involvement, expectations from parents and teachers, school dislike and negative school environment as covariates. As in the first analysis, the analyses were performed separately by gender and by grade level.

RESULTS AND DISCUSSION

Achievement and overweight: Table 2 shows descriptive statistics on student perceived school performance by overweight for each gender and for each grade level. The results of the regression analyses by gender and by grade level were shown in Table 3. As can be seen in Table 3, after adjusting the effects of covariates used in the analyses, the only statistically significant association found between overweight and perceived achievement was for female students, with the overweight female students across all grade levels reporting less perceived achievement in comparison to non-overweight female students. No statistically significant association was found for male adolescents at any grade level.

Sociological consequences and overweight: In the second set of analyses, we examined the sociological consequences of overweight by gender and by grade level. In these analyses, two scales were used as measures of sociological consequences: perceived student friendliness and perceived teacher caring. In the analyses, these two measures were used as dependent variables and overweight was used as the independent variable, with parental education level, race, body image and other school-related variables (i.e., school dislike, negative school environment, expectations from teachers and parents) as covariates. Table 4 shows the descriptive statistics on perceived student friendliness and teacher caring and Table 5 shows the results of the regression analyses. The regression results revealed the statistically significant effect for student friendliness but not for teacher caring for both male and female students after adjusting for the effects of the covariates. Both overweight male and female students reported less student friendliness than the non-overweight students.

On the other hand, the overweight students at grades 8, 9 and 10 reported less student friendliness in comparison to non-overweight students. However, after adjusting for the effects of covariates in the analysis, we found no consistent pattern of association between teacher caring and overweight.

Since the research that directly links a healthy weight to academic achievement is still tenuous, this study has examined the effects of overweight on both achievement and sociological consequences, with particular attention to perceived student friendliness and teacher caring. We have focused on the issue of overweight and partialled out the effects that might be attributable to disparities in perceived achievement and sociological consequences. Such a use of covariates was necessary in that some previous studies failed to account for the effects of covariates (e.g., SES, poverty, home environment) on the main study variable of overweight. For example, in a study of the effects of subjective obesity on academic achievement, Freeman[21] accounted for such variables as gender, objective and subjective obesity, teacher expectations

Table 2: Means and standard deviations of perceived school performance by gender and by grade level

Gender	Overweight	Mean Score	
Male	No (n = 6225)	2.74	(0.92)
	Yes (n = 1022)	2.60	(0.94)
Female	No (n = 7365)	2.89	(0.87)
	Yes (n = 932)	2.79	(0.89)
Grade			
6	No (n = 2710)	2.94	(0.91)
	Yes (n = 211)	2.81	(0.92)
7	No (n = 2394)	2.87	(0.90)
	Yes (n = 252)	2.73	(0.96)
8	No (n = 2986)	2.84	(0.89)
	Yes (n = 398)	2.75	(0.93)
9	No (n = 2910)	2.76	(0.88)
	Yes (n = 523)	2.65	(0.93)
10	No (n = 2488)	2.71	(0.88)
	Yes (n = 534)	2.62	(0.89)

Note: The number in parenthesis is standard deviation

Table 3: Regression coefficients of overweight on perceived school performance by gender and by grade level

Gender	β	*t* value
Male	-0.05 (-0.13 ~ 0.02)	-1.55
Female	-0.11 (-0.19 ~ -0.02)	-2.40*
Grade		
6	-0.19 (-0.41 ~ 0.04)	-1.68
7	-0.16 (-0.36 ~ 0.05)	-1.47
8	-0.04 (-0.19 ~ 0.09)	-0.68
9	-0.05 (-0.17 ~ 0.07)	-0.84
10	-0.01 (-0.12 ~ 0.09)	-0.28

Note: [1]0 = not overweight (the reference group) and 1 = overweight. [2] The number in parenthesis is 95% confidence interval. [3]A high score on the dependent variable perceived school performance indicates higher perceived school performance. * $p < .05$

Table 4: Means and standard deviations of perceived student friendliness and teacher caring by gender and by grade level

Gender	Overweight	Student friendliness		Teacher caring	
Male	No (n = 6225)	3.41	(0.91)	3.45	(0.90)
	Yes (n = 1022)	3.31	(0.93)	3.39	(0.94)
Female	No (n = 7365)	3.49	(0.85)	3.50	(0.82)
	Yes (n = 932)	3.33	(0.86)	3.44	(0.88)
Grade					
6	No (n = 2746)	3.46	(0.95)	3.58	(0.91)
	Yes (n = 213)	3.31	(1.00)	3.53	(0.93)
7	No (n = 2394)	3.43	(0.90)	3.45	(0.89)
	Yes (n = 252)	3.35	(0.95)	3.43	(0.99)
8	No (n = 3018)	3.50	(0.89)	3.45	(0.87)
	Yes (n = 398)	3.34	(0.95)	3.27	(0.95)
9	No (n = 2932)	3.42	(0.83)	3.45	(0.82)
	Yes (n = 524)	3.26	(0.81)	3.46	(0.85)
10	No (n = 2500)	3.48	(0.80)	3.45	(0.80)
	Yes (n = 541)	3.36	0.87	3.42	0.89

Note: The number in parenthesis is standard deviations

Table 5: Regression coefficients of overweight on student friendliness and teacher caring by gender and by grade level

	Student friendliness		Teacher caring	
Gender	β	*t* value	β	*t* value
Male	-0.09 (-0.18 ~ -0.02)	-2.36*	0.02 (-0.06 ~ 0.11)	0.69
Female	-0.14 (-0.23 ~ -0.06)	-3.28**	0.01 (-0.05 ~ 0.07)	0.47
Grade				
6	-0.04 (-0.22 ~ 0.14)	-0.44	0.19 (0.06 ~ 0.32)	2.97**
7	-0.09 (-0.28 ~ 0.11)	-0.92	-0.01 (-0.14 ~ 0.12)	-0.10
8	-0.15 (-0.27 ~ -0.03)	-2.48*	-0.19 (-0.32 ~ -0.07)	-3.17**
9	-0.13 (-0.22 ~ -0.04)	-2.89**	0.12 (0.02 ~ 0.20)	2.33*
10	-0.12 (-0.23 ~ -0.01)	-2.19*	0.02 (-0.07 ~ 0.11)	0.45

Note. [1] 0 = not overweight (the reference group) and 1 = overweight. [2] The number in the parenthesis is 95% confidence interval. [3]A high score on variables student friendliness and teacher caring indicates higher level of student friendliness and teacher caring. * $p < .05$. ** $p < .01$

and academic self-concept, but he did not take into account the effects of socioeconomic status, which have been shown to account for about 18 percent of variability in GPA scores[23].

Therefore, in this study we have included some main covariates such as race, parental education level, body image and other school-related variables such as parental school involvement, expectations from teachers and parents, school dislike and negative school environment. To control for the effects of age/grade level and gender, the analyses were performed by gender and by grade level. The main findings of the study showed that after adjusting for the effects of the covariates, the overweight female students tended to report less perceived achievement than their counterparts. This was not true for overweight male students. One possible reason for this finding may be considered within theoretical models proposed by Lerner and Patzer for understanding the association between physical appearance and social functioning[25,31]. These models indicate that physical appearance evokes different reactions within a cultural environment that has high standards for physical beauty. Young adolescents are especially reliant on physical characteristics in their social interactions and their perceptions are likely influenced by stereotypes associated with these characteristics (e.g., good looking is also smart)[20,25]. Therefore, the overweight female students may have internalized the negative perceptions of others, such as negative perceptions of the obesity stereotype, especially as the girls became more aware of themselves during the changes of puberty. This might lead to a lower level of self-esteem and a higher level of anxiety and stress – each of which may be associated with perceived less school performance.

However, besides this statistically significant finding for overweight female students, overweight was not found to be associated with less perceived achievement for students across all grade levels after controlling for the effects of covariates used in the study. This was not expected since some studies have shown a relationship between weight and achievement for different age groups[32]. This may be due to the fact that different variables must be controlled in studies of achievement and the underlying causes of less perceived academic achievement among overweight students might be related to other variables, such as parents' level of education, school liking and/or race. In this study, we had controlled the effects of these confounding variables and thus, overweight did not show a statistically significant association with perceived achievement. This may indicate that overweight may not be directly affecting student cognitive functioning, as the researchers suggested that overweight did not directly affect academic performance, but it could be used as a predictor of performance[22].

The sociological consequence of overweight manifested itself in perceived less student friendliness by overweight students across gender, especially when they got older. It was possible that overweight adolescents were more likely to be mistreated than their non-overweight counterparts, or that the overweight adolescents tended to interact less effectively with their peers due to their physical appearance, resulting in negative social interaction. This finding was consistent with previous studies that showed being overweight could lead to health/social problems in school-aged children, including depression and anxiety, loneliness and low self-esteem[33-35].

In spite of the broad set of controls available to and utilized in this study, cross-sectional analysis would not necessarily have controlled for all differences between overweight and non-overweight children with respect to achievement, especially those differences that were unobserved. For example, nutrition, lifestyle and quality of home environment were not adequately captured from the survey data, which should have been controlled for in the study. Additionally, other factors exist that would affect academic achievement. One example would be that the student's own negative attitudes and the social discrimination of his or her peers would also affect a student's perceived academic performance. It was possible that adolescents might use eating as a mechanism for coping with stress. It followed that if the student were stressed at school and used overeating to cope, then overweight might be an effect of poor academic performance, not a potential cause.

Another limitation of the study was that the measure of academic achievement was subjectively reported by students using a single item. This may not provide the best measure of student school performance. While it was important to examine school performance from students' perspectives, this information should be supplemented by more objective measures of achievement, such as test scores or academic GPA. In addition, it should be noted that although we found significant differences between overweight and non-overweight adolescents, the magnitude of those differences as measured by the coefficients seemed small and they may not have any practical significance.

Implications: The importance of this study lies in the fact that it directly investigates the effect of overweight on perceived school performance using a nationally representative sample while controlling for some important confounding variables that may be attributable to the disparities in perceived school performance. The findings confirm that adolescent overweight is associated with problems in school performance and social relationships, especially for female students. It highlights the needs to help overweight adolescents recognize and adjust to overweight-related school issues. However, overweight should not be viewed as the underlying cause of poor academic achievement, especially with respect to cognitive functioning. Rather, overweight could be considered as a risk factor for potential social and psychological problems that may lead to maladjustment in school life. Practitioners should be aware of the stigma that may attach to overweight adolescents and consider overweight adolescents as "potentially high risk for maladjustment for school." Thus, particular attention should be paid to providing these students with opportunities to build strong self-esteem and self-confidence.

The behavioral manifestations described in this study are just preliminary observations. Although the strength of this study included a large, racially and economically diverse national representative sample of school-aged children, careful consideration should be made in describing the implications of the findings. Future studies need to keep this perspective in mind.

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