Research Papers

Self-Reported Weight Perceptions, Dieting Behavior, and Breakfast Eating Among High School Adolescents

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ABSTRACT: *This study explored the relationships among weight perceptions, dieting behavior, and breakfast eating in 4597 public high school adolescents using the Centers for Disease Control and Prevention Youth Risk Behavior Survey. Adjusted multiple logistic regression models were constructed separately for race and gender groups via SUDAAN (Survey Data Analysis). Adjusted odds ratios [ORs] and 95% confidence intervals were calculated to determine the strength of relationships. Approximately 42% of the sample reported not eating breakfast within the past 5 days, while 41% were trying to lose weight, and 37% were dieting to lose weight. Excessive dietary practices (eg, fasting, taking diet pills or laxatives, and vomiting to lose weight) were reported by approximately 25% of the sample. When compared to those eating breakfast within the past 5 days, all race and gender groups that did not report eating breakfast were significantly more likely to report fasting to lose weight (ORs = 1.70-2.97). In addition, all race/gender groups, with the exception of black females, were significantly more likely to perceive themselves as overweight (ORs = 1.44-1.61) and trying to lose weight (ORs = 1.40-1.72). Among males, not eating breakfast was significantly associated with taking diet pills to lose weight (ORs = 2.31-2.40), eating fewer calories to lose weight (ORs = 1.38-1.49), and inversely associated with trying to gain weight (ORs = 0.71-0.74). Results suggest that these adolescents may be skipping breakfast as part of a patterned lifestyle of unhealthy weight management and that efforts to encourage youth to eat breakfast will likely not ameliorate all dietary challenges that appear beyond the scope of increased breakfast offerings.* (J Sch Health. 2006;76(3):87-92)

Adolescence, a time of great change and uncertainty with the onset of puberty, is often accompanied by preoccupation with body size and shape among youth. Average weight gain is approximately 31 lb (14 kg) for females and 33 lb (15 kg) for males,[1] with differences in body shape and size between the sexes evident. Although body dissatisfaction and issues occur more often in females, recent evidence suggests that males are increasingly concerned with body weight as well.[2-5] Ironically, while anxiety about body weight remains an issue, including stereotypes about body weight,[6] the US population has become the most obese in the world.[7]

In 2000, 15.5% of adolescents (ages 12-19 years) were overweight, while an additional 14.9% of adolescents were at risk for being overweight (body mass index [BMI] for age between the 85th and 95th percentile).[8] Thompson et al[9] suggested powerful sociocultural forces, such as family, peers, and media, contribute to body language, body image, and eating disorders in American culture. As a consequence, discontent with one's body continues to cause insufficient nutritional intake when there are feelings of social vulnerability and intense self-consciousness.[10]

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Common dietary practices used for weight control are reducing food intake, skipping meals, and fasting. Some adolescents may reduce their food intake or skip meals altogether, especially breakfast. In a recent study of 700 ninth graders in Louisiana who completed a 24-hour recall of dietary intake, both girls (23%) and boys (14%) skipped breakfast. Overall, results showed that 19% of the students skipped breakfast.[11] Skipping meals is detrimental because only 2% of school-aged children currently meet the recommended minimum number of servings for all 5 major food groups in the Food Guide Pyramid.[12] Nutritionists recommend that one third of daily calories should be eaten for breakfast, so missing or deliberately skipping breakfast will compromise health, energy levels, and cognitive performance.[13]

Breakfast consumption may vary by gender, particularly those with poor body image and/or weight preoccupation. A study to determine prevalence of breakfast consumption, physical activity, and smoking among secondary school students in an Ontario (Canada) community found that 48.8% of boys and 36.1% of girls ate breakfast daily. Furthermore, 63.9% of girls were concerned about their body weight compared to 36.1% of the boys. Among girls concerned about body weight, a larger proportion was more likely to skip breakfast compared to those who were not concerned.[14]

Societal pressures often influence females more than males to be more concerned about their weight, resulting in a higher prevalence of distorted body image and more stringent weight-control goals. Paxton et al[15] examined the factors of weight-control behavior among public high school students in South Carolina by finding race and gender differences in BMI, body weight self-perception, weight-management goals and practices. However, even

though gender and ethnic differences have been documented for body shape, body image, and weight control,[16-18] little research has investigated the role of breakfast eating in the context of unhealthy weight management. Breakfast makes important contributions to American adolescents' dietary intakes such as calcium,[19] and much effort has been expended on improving breakfast composition in our schools.[20] However, such efforts may not have the intended impact if students are choosing to bypass breakfast altogether, owing to an unhealthy preoccupation with body weight and engagement in extreme dieting practices. Therefore, the purpose of this study was to investigate the relationships between body weight perceptions, dieting behaviors, and breakfast eating among adolescents.

METHODS

The Youth Risk Behavior Survey (YRBS), distributed in South Carolina, was used for this exploratory analysis. The YRBS used a sampling procedure designed to obtain a representative sample (with the exception of special education schools) of all high school students in grades 9-12. The YRBS has established adequate reliability.[21] The Youth Risk Behavior Surveillance System focuses on 6 major areas of adolescent behaviors: those that lead to intentional and unintentional injuries, tobacco, alcohol and other drug use, sexual behaviors, dietary behaviors, and physical inactivity.[22]

Schools were randomly selected using a systematic basis for each enrollment size category, by using PCSAMPLE, a computerized sampling program, which narrowed the 241 eligible schools to 71 schools in 87 districts, statewide. The 241 schools were stratified into 3 enrollment categories: schools with 74 to 874 students were classified as small, schools with enrollments from 875 to 1278 were classified as medium, and schools of more than 1279 students were classified as large. Our data include 58 of the 71 eligible schools (82% response rate) with 4597 usable questionnaires from 5563 sampled students (83% response rate) for an overall response rate of 68% (82 $\times$ 83%). These weighted results can be used to make important references concerning the priority health risk behaviors of regular public high school students in grades 9-12.

Classes that met during second period were eligible for classroom level sampling selection to maximize student eligibility. Using random starts, classes were selected with systematic equal probability sampling. When the number of students selected by PCSAMPLE was substantially less than expected, class samples were increased by the same systematic sampling of additional classes. The desired number of participants ($n = 125$) was met by most schools. The survey was anonymous in that no personal identification was recorded. A school and class code was used for Centers for Disease Control and Prevention reporting purposes. Parent notification forms were distributed at least 5 days in advance of survey administration; those parents who did not want their children to participate were required to return the form. Survey administrations were conducted by trained data collectors, emphasizing anonymity, privacy, and confidentiality. This research was approved by the host university's review board for the rights of human subjects in research.

Data Analysis

The analyses were conducted separately for the 4 race and gender groups, white females (WF), black females (BF), white males (WM), and black males (BM). The use of indicator or dummy variables to represent the 4 groups (WF, BF, WM, BM) would have assumed that the coefficients of all risk and confounding variables were constant across all 4 race and gender groups. Because this assumption was false, the 4 groups were analyzed separately.

The dependent variable for this study asked students "During the past 5 school days, where did you mostly eat breakfast?". The 5 response options were "no breakfast past 5 days"; "breakfast in cafeteria most"; "breakfast at home most"; and "ate, but not at home, school." These responses were collapsed and dichotomized into "yes, I ate breakfast" and "no, I did not eat breakfast" for our analyses with those who ate breakfast serving as the referent group. Multiple logistic regression was conducted using SAS-callable Survey Data Analysis (SUDAAN)[23] at $\alpha = .05$. SUDAAN takes into account the weighting as well as the clustering within schools and classes nested within schools. Adjusted odds ratios (OR) and confidence intervals were calculated to determine which weight perception and dietary behaviors were associated with those who did not eat breakfast, for each race and gender group. Variables that did not meet the .05 significance level were not retained in the model. All students who did not answer questions used in the regression procedure were excluded from the analysis by numerical procedures of SAS/SUDAAN.

The independent variables explored in this study were as follows: self-perceptions of weight (overweight/underweight), current weight goal (trying to lose/gain weight), dieted to lose weight (past 30 days), fasted to lose weight (past 30 days), took diet pills to lose weight (past 30 days), and vomited or took laxatives to lose weight (past 30 days) (Table 1). Adolescents were categorized as having reported the behavior or not, with the referent group designated as those who did not report any of the dieting behaviors, those who reported perceptions of being at the right weight, and those who reported wanting to remain at their current weight. SAS/SUDAAN automatically deleted any incomplete record. Frequencies and percentages for all study variables are presented in Table 1 by race and gender.

RESULTS

Description of Subjects

The total number of subjects who participated in the 1999 YRBS was 4597. However, only 4175 valid observations were available for this analysis owing to (a) nonresponse by subjects to the variables of interest, (b) responses that could not be read via optical scanning, (c) out-of-range responses, and (d) exclusion of subjects who reported their race as "other" than black or white ($n = 383$, 9.2%). Failure to answer any variable of interest also resulted in deletion ($n = 163$, 3.9%). Of the survey participants, 2257 (54.0%) were female and 1918 (46.0%) were male. White females accounted for the largest population (29.0%), followed by white males (25.2%), black females (25.1%), and black males (20.8%). Approximately 31% ($n = 1302$) of the study population was in 9th

grade, followed by 10th (n = 962, 23%), 11th (n = 985, 23.6%), and 12th (n = 910, 21.8%) grade students. Sixteen students (0.4%) did not indicate their grade. Only 10 (0.2%) students in the sample were ⩽13 years of age; most students (n = 3598, 86.2%) were between 14 and 17 years of age, and 567 students (13.6%) were 18 years or older.

Association Between Not Eating Breakfast, Weight Perceptions, and Dieting Behaviors

White Females. Significant associations were established between not eating breakfast (past 5 days) and self-perceptions of overweight (OR = 1.44), dieted to lose weight (OR = 1.40), fasted to lose weight (OR = 2.97), and vomited or took laxatives to lose weight (OR = 1.76) for white females (Table 2). White adolescent females who reported inappropriate dieting behaviors and negative weight perceptions increased the odds of reporting not eating breakfast between 1.4 and 2.97 times when compared to those white females who did not report these dieting behaviors and negative weight perception variables.

Black Females. Only 1 significant relationship was established between not eating breakfast (past 5 days) and fasted to lose weight (OR = 1.77) for black females (Table 2). Black adolescent females increased the odds of reporting not eating breakfast 1.77 times if they reported fasting to lose weight in comparison to those black females who reported not fasting to lose weight.

White Males. Significant associations were established between not eating breakfast (past 5 days) and 5 variables: self-perceptions as overweight (OR = 1.47), trying to lose weight (OR = 1.43), eating fewer calories to lose weight (OR = 1.38), fasted to lose weight (OR = 2.14), and took diet pills to lose weight (OR = 2.40) for white males (Table 2). However, 1 significant protective association was also detected for trying to gain weight (OR = 0.74) and not eating breakfast (past 5 days). Thus, white adolescent males who reported inappropriate eating behaviors and negative weight perceptions increased the odds of reporting not eating breakfast between 1.38 and 2.40 times when compared to those white males who did not report these dieting and weight perception variables. However, white males who reported trying to gain weight significantly decreased their odds of reporting not eating breakfast (past 5 days).

Black Males. Significant relationships were established between not eating breakfast (past 5 days) and 5 variables: self-perceptions as overweight (OR = 1.61), trying to

Table 1
Weight Perceptions and Dieting Behavior Variables by Race and Gender: Frequency (n) and Weighted Percent (%)

Risk Variable	White Females (1208), n (%)	Black Females (1049), n (%)	White Males (1051), n (%)	Black Males (867), n (%)
Self-perceptions of weight				
About the right weight	449 (37.2)	335 (31.9)	254 (24.1)	151 (17.4)
Overweight	615 (50.9)	554 (52.8)	597 (56.8)	506 (58.4)
Underweight	144 (11.9)	160 (15.2)	200 (19.1)	210 (24.2)
Current weight goal				
Stay the same weight	449 (37.2)	372 (35.5)	504 (48.0)	327 (37.7)
Trying to lose weight	706 (58.4)	508 (48.4)	261 (24.8)	231 (26.7)
Trying to gain weight	53 (4.4)	169 (16.1)	286 (27.2)	309 (35.6)
Dieted to lose weight (past 30 days)				
Yes	699 (57.9)	404 (38.5)	248 (23.6)	203 (23.4)
No	509 (42.1)	645 (61.5)	803 (76.4)	664 (76.6)
Fasted to lose weight (past 30 days)				
Yes	228 (18.9)	150 (14.3)	76 (7.2)	110 (12.7)
No	980 (81.1)	899 (85.7)	975 (92.8)	757 (87.3)
Took diet pills to lose weight (past 30 days)				
Yes	136 (11.3)	65 (6.2)	48 (4.6)	64 (7.4)
No	1072 (88.7)	984 (93.8)	1003 (95.4)	803 (92.6)
Vomited or took laxatives to lose weight (past 30 days)				
Yes	94 (7.9)	68 (6.5)	26 (2.5)	61 (7.0)
No	1114 (92.2)	981 (93.5)	1025 (97.5)	806 (93.0)
Ate breakfast, past 5 school days				
Yes	674 (55.8)	557 (53.1)	685 (65.2)	517 (59.6)
No	534 (44.2)	492 (46.9)	366 (34.8)	350 (40.4)

lose weight (1.72), eating fewer calories to lose weight (OR = 1.49), fasted to lose weight (OR = 1.71), and took diet pills to lose weight (OR = 2.31) for black males (Table 2). However, similar to white males, 1 significant protective association was detected for trying to gain weight (OR = 0.71) and not eating breakfast (past 5 days) for black males as well. Thus, black adolescent males who reported inappropriate eating behaviors and negative weight perceptions increased the odds of reporting not eating breakfast between 1.49 and 2.31 times when compared to those black males who did not report these dieting and weight perception variables. In addition, black males who reported trying to gain weight significantly decreased their odds of reporting not eating breakfast (past 5 days). These significant relationships mirrored white males in this study.

DISCUSSION

This study demonstrated the ability of 1 nonintrusive item to reveal problematic weight perceptions and inappropriate dietary practices among a large, stratified random sample of adolescents in South Carolina. Results suggest that a substantial number of public high school adolescents are reporting not eating breakfast on an average school day. Approximately 42% (n = 1742) of our study sample reported not eating breakfast during the past 5 school days. Although recent research suggests lower socioeconomic status children and adolescents are more likely to skip breakfast,[24] this phenomenon cannot fully explain this study's findings.

Study results suggest that a substantial number of public high school students in South Carolina are experiencing negative weight perceptions and practicing inappropriate dieting behaviors. More than one half of the participants (n = 2272) reported perceptions of being overweight compared to 23% of adolescents perceiving themselves overweight in a study by Brener et al.[25] Study findings also revealed that approximately 41% of adolescents (n = 1706) were trying to lose weight at the time of this study, which is consistent with Paxton et al[15] who reported on 41.7% of high school students trying to lose weight. With a large portion of the sample believing they are overweight and actually trying to lose weight, it is important to consider dieting behaviors reported in this study. Thirty-seven percent (n = 1554) of students reported eating fewer calories to lose weight in the past 30 days, while 25% of the sample (n = 1126) admitted to inappropriate dietary practices such as fasting, taking diet pills or laxatives, and vomiting.

This study also demonstrated the importance of distinguishing between gender and race as moderators of the relationships between eating breakfast, weight perceptions, and dieting behaviors. For example, this study suggests that eating breakfast and some inappropriate dieting behaviors and negative weight perceptions were more prevalent among white females, white males, and black males, although black females reported only fasting to lose weight as significantly related to not eating breakfast. However, fasting to lose weight was also significantly associated with not eating breakfast for all race and gender groups. Compromised nutritional intake during formative years and fasting for weight loss, while normative, are not benign behaviors,[26] with problems ranging from acute self-consciousness to debilitating eating disorders.

An additional, significant protective association was also detected among males, but not for females, who reported trying to gain weight. Males who reported trying to gain weight were significantly less likely to skip breakfast. This may reflect the fact that males believe they need to increase their energy intake to gain weight (most likely muscle mass) for greater social acceptance and self-esteem[27,28] for the same reasons females engage in extreme dieting practices to manage weight.

The association between not eating breakfast and negative perceptions of body weight (males and white females), trying to lose weight (males and white females), eating fewer calories to lose weight (males), fasting to lose weight (males and females), taking diet pills to lose weight (males), and vomiting or taking laxatives to lose weight (white females) for adolescents may be explained in part by national trends in the United States.[29] For

Table 2
Associated Perceptions of Weight and Dieting Behaviors and Not Eating Breakfast by Race and Gender

	Odds Ratio and 95% Confidence Interval			
Dieting Behavior	**White Female**	**Black Female**	**White Male**	**Black Male**
Self-perceived as slightly/very underweight	0.94 (0.73-1.21)	1.14 (0.80-1.63)	0.79 (0.58-1.09)	1.08 (0.83-1.40)
Self-perceived as slightly/very overweight	1.44*** (1.19-1.73)	1.12 (0.82-1.52)	1.47* (1.02-2.13)	1.61** (1.11-2.32)
Trying to gain weight	0.52 (0.26-1.05)	1.05 (0.78-1.41)	0.74* (0.55-0.98)	0.71* (0.50-0.97)
Trying to lose weight	1.40** (1.12-1.75)	1.22 (0.96-1.57)	1.43* (1.02-2.02)	1.72** (1.16-2.56)
Dieted to lose weight (past 30 days)	1.15 (0.89-1.49)	1.27 (0.94-1.72)	1.38* (1.03-1.90)	1.49** (1.11-2.01)
Fasted to lose weight (past 30 days)	2.97*** (1.95-4.54)	1.77** (1.12-2.79)	2.14** (1.28-3.56)	1.71** (1.11-2.60)
Took diet pills to lose weight (past 30 days)	1.33 (0.98-1.80)	2.04 (0.97-4.30)	2.40** (1.32-4.37)	2.31** (1.24-4.31)
Vomited or took laxatives to lose weight (past 30 days)	1.76** (1.20-2.58)	1.32 (0.71-2.44)	1.37 (0.65-2.89)	1.38 (0.88-2.16)

* $p < .05$; ** $p < .01$; *** $p < .001$.

example, a national survey of 8th- and 10th-grade students in the United States found that 32% skipped meals, 22% fasted, 7% used diet pills, 5% induced vomiting after meals, and 3% used laxatives to lose weight.[30] Thus, adolescents who engaged in poor dietary practices with poor weight perceptions may be more likely to skip breakfast (and possibly other meals) to control weight. Some suggest that fear of fatness and recurrent dieting are more than risk factors, actually representing the earlier stages of an eating disorder, at least for some people.[31]

Although it is difficult to determine from this cross-sectional study, it is possible that some of the adolescents have started the process of developing an eating disorder. It is not uncommon for eating disorders to begin in early adolescence, with greater than 90% of reported eating disorders occurring among females.[9,32,33] Students in this study who reported not eating breakfast, having poor perceptions of body weight, and practicing improper dieting behavior could be suffering from anorexia nervosa or bulimia nervosa. These eating disorders may cause serious mental and emotional complications and possibly mortality.[17]

Study limitations should be noted here. First, the use of a cross-sectional study design precludes determination of the temporal sequence of breakfast eating and body weight perceptions. Second, this study may reflect only youth in South Carolina and may not be nationally representative. Third, interpretations made in this study are limited to high school students completing a survey using a self-report protocol in public schools. Finally, the logistic regression analyses (SAS/SUDAAN) called for the elimination of subjects with missing data on the variables of interest. Therefore, observed associations are likely to be conservative (ie, an underestimate of the magnitude of the reported associations).

CONCLUSIONS

Despite the stated limitations, our study demonstrated an important association between self-reported breakfast eating, weight perceptions, and dieting behaviors among high school students. Although efforts to encourage adolescents to eat breakfast have increased,[34] it appears that many students may not be taking full advantage of school breakfast programs (or breakfast in general), owing to, perhaps, an unhealthy preoccupation with weight and drastic weight-loss behaviors. Of students who reported eating breakfast, only 13% ($n = 557$) of students reported eating breakfast in the school cafeteria.

Previous research among Australian youth would suggest that skipping breakfast is a matter of choice for most youth (eg, lack of time, lack of sleep, not hungry) as opposed to socioeconomic status as has been suggested in the United States.[35,36] However, although speculative, our results suggest that adolescents may be skipping breakfast as part of a patterned lifestyle of unhealthy weight management. Whatever the case, nutritional problems, among others, lie beneath many learning problems, as hunger affects adolescents' concentration and ultimately their ability to learn,[37,38] and these poor nutritional habits may manifest themselves as early as 10 years of age.[27]

Based on these findings, it seems unlikely that efforts to encourage youth to eat breakfast will ameliorate all the dietary challenges facing today's adolescents, as these unhealthy weight perceptions and dietary practices reach beyond the scope of increased breakfast offerings. However, several recommendations are offered. First, health educators, teachers, and other human-service personnel who work with youth should discuss the prevalence and ramifications of skipping meals, specifically breakfast. Second, by engaging students in more comprehensive programming to affect students' body image, eating attitudes, and behaviors,[10,28] lasting changes in self-image and lifestyle may result. As part of this comprehensive programming over several years, not just in a 1-semester high school health course, problematic students could be identified and assisted through referral to health personnel knowledgeable about adolescent development. Health professionals could query students with several key questions in a nonjudgmental style. For example, students could be asked, "How much would you like to weigh?", "How do you feel about your weight?", and "Are you or anyone close to you worried about your eating behavior?". Observed student distress about weight and food concerns should heighten concern, and referral is advised.[1] Finally, additional research seems warranted to better understand why students are skipping breakfast and to determine if skipping breakfast is a possible indicator of disordered eating among gender and racial groups. ■

References

1. Nicholls D, Viner R. ABC of adolescence: eating disorders and weight problems. *BMJ*. 2005;330:950-953.

2. Berg FM. *Children and Teens Afraid to Eat*. Hettinger, ND: Healthy Weight Publishing Network; 2001.

3. Keel PK, Klump KL, Leon GR, Fulkerson JA. Disordered eating in adolescent males from a school-based sample. *Int J Eat Disord*. 1998;23(2):125-132.

4. McCreary DR, Sasse DK. An exploration of the drive for muscularity in adolescent boys and girls. *J Am Coll Health*. 2000;48(6):297-304.

5. Valois RF, Zullig KJ, Huebner ES, Drane JW. Dieting behaviors, weight perceptions, and life satisfaction among public high school adolescents. *Eat Disord*: J Treat Prev. 2003;11:271-288.

6. Wooley SC, Garner DM. Obesity treatment: the high cost of false hope. *J Am Diet Assoc*. 1991;91(10):1248-1251.

7. National Institutes of Health, National Heart, Lung, and Blood Institute. *NILBI Guidelines: Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report*. Bethesda, Md; 1998.

8. Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999-2000. *JAMA*. 2002;288:1728-1732.

9. Thompson SH, Corwin SJ, Sargent RG. Ideal body size beliefs and weight concerns of fourth grade children. *Int J Eat Disord*. 1997;21: 279-284.

10. Kater KJ, Rohwer J, Londre K. Evaluation of an upper elementary school program to prevent body image, eating, and weight concerns. *J Sch Health*. 2002;72(5):199-204.

11. Nicklas TA, Reger C, Myers L, O'Neil C. Breakfast consumption with and without vitamin-mineral supplement use favorably impacts daily nutrient intake of ninth grade students. *J Adolesc Health*. 2000;27(5): 314-321.

12. Gleason P, Suitor C. *Children's Diets in the Mid-1900's: Dietary Intake and Its Relationships With School Meal Participation*. Alexander, Va: US Dept of Agriculture; 2001. Report No. CN-01-CD1.

13. Bayne-Smith M, Fardy PS, Azzollini A, Magel J, Schmitz KH, Agin D. Improvements in heart health behaviors and reduction in coronary artery disease risk factors in urban teenaged girls through a school-based intervention: the PATH program. *Am J Public Health*. 2004;94(9): 1538-1543.

14. Cohen B, Evers S, Manske S, Bercovitz K, Edward HG. Smoking, physical activity and breakfast consumption among secondary school

students in a southwestern Ontario community. *Can J Public Health*. 2003;94(1):41-44.

15. Paxton RJ, Valois RF, Drane JW. Correlates of body mass index, weight goals, and weight-management practices among adolescents. *J Sch Health*. 2004;74(4):136-143.

16. Fallon AE, Rozin P. Sex differences in perceptions of desirable body shape. *J Abnorm Psychol*. 1995;94:102-105.

17. Herzog DB, Copeland PM. Eating disorders. *N Engl J Med*. 1985;13(5):295-303.

18. O'Dea J, Abraham S, Heard R. Food habits, body image and weight control practices of young males and female adolescents. *Aus J Nutr Diet*. 1996;53:32-38.

19. Gordon AR, Devaney BL, Burghardt JA. Dietary effects of the National School Lunch Program and the School Breakfast Program. *Am J Clin Nutr.* 1996;61(suppl 1):221S-231S.

20. Dwyer JT, Hewes LV, Mitchell PD. et al. Improving school breakfasts: effects of the CATCH Eat Smart Program on the nutrient content of school breakfasts. *Prev Med*. 1996;25:413-425.

21. Brener ND, Kann L, McManus T, Kinchen SA, Sunberg EC, Ross JG. Reliability of the 1999 Youth Risk Behavior Survey Questionnaire. *J Adolesc Health*. 2002;31:336-342.

22. Kolbe LJ. An epidemiological surveillance system to monitor the prevalence of youth behaviors that most affect health. *J Health Educ*. 1990;21(6):44-48.

23. Research Triangle Institute. *SUDAAN* (Release 8.0) [Computer Software]. Research Triangle Park, NC: Research Triangle Institute; 2002.

24. O'Dea JA, Caputi P. Association between socioeconomic status, weight, age and gender, and the body image and weight control practices of 6- to 19-year-old children and adolescents. *Health Educ Res*. 2001;16(5):521-532.

25. Brener ND, Eaton DK, Lowry R, McManus T. The association between weight perceptions and BMI among high school students. *Obes Res*. 2004;12(11):1866-1874.

26. Neumark-Sztainer D. Excessive weight preoccupation: normative but not harmless. *Nutr Today.* 1995;30:68-74.

27. McVey G, Tweed S, Blackmore E. Correlates of weight loss and muscle-gaining behavior in 10- to 14-year-old males and females. *Prev Med*. 2005;40(1):1-9.

28. O'Dea JA, Abraham S. Improving the body image, eating attitudes, and behaviors of young male and female adolescents: a new educational approach that focuses on self-esteem. *Int J Eat Disord*. 2000;28(1):43-57.

29. Youth risk behavior surveillance—United States, 1999. CDC surveillance summary. *MMWR Morb Mortal Weekly Rep*. 2000;49:23-24(No.SS-5).

30. Kann L, Kinchen SA, Williams BI, Ross JG, Lowry R, Grunbaum JA, Kolbe LJ. American School Health Association, Association for the Advancement of Health Education and the Society for Public Health Education. *The National Adolescent Health Survey: A Report on the Health of America's Youth*. Oakland, Calif: Third Party Publishing; 1989.

31. Franko D, Orosan-Weine P. The prevention of eating disorders: empirical, methodological, and conceptual considerations. *Clin Psychol: Sci Pract*. 1998;5:459-477.

32. American Psychiatric Association. *American Psychiatric Association Task Force On DSM-IV. Diagnostic and Statistical Manual of Mental Disorders: DSM-IV.* Washington, DC; 1994.

33. Beals KA, Manore MM. The prevalence and consequences of subclinical eating disorders in female athletes. *Int J Sport Nutr.* 1994;4: 175-195.

34. Burghardt JA, Gordon AR, Fraker TM. Meals offered in the National School Lunch Program and the School Breakfast Program. *Am J Clin Nutr.* 1995;61(suppl 1):187S-198S.

35. Gleason PM. Participation in the National School Lunch Program and the School Breakfast Program. *Am J Clin Nutr.* 1995;61(suppl 1): 213S-220S.

36. Shaw ME. Adolescent breakfast skipping: an Australian study. *Adolescence*. 1998;33(132):851-861.

37. Costante C. Healthy learners: the link between health and student achievement. *Am Sch Board J*. 2002;January:1-3.

38. Marx E, Wooley SF, Northhop D. *Health Is Academic: A Guide to Coordinated School Health Programs*. New York, NY: Teachers College Press; 1998.

UPDATE

"In 2004, research for children funded through all National Institutes of Health totaled $3.132 billion; the total National Institutes of Health budget was $27.888 billion (11.23%). Children aged 0 to 19 years, numbered 79.4 million of the 282.9 million individuals in the United States (20.07%). Given the concept that healthier children will yield healthier adults who may contribute to society in numerous ways, one could argue for an expansion of federal support for pediatric research at a level proportionate to the percent of children in the total population."

Source: Feigin, RD. Prospects for the Future of Child Health Through Research. *JAMA*. 2005;294:1373-1379.