

Weight Teasing and Disordered Eating Behaviors in Adolescents: Longitudinal Findings From Project EAT (Eating Among Teens)

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ABSTRACT

OBJECTIVE. To assess whether weight-related teasing predicts the development of binge eating, unhealthy weight control behaviors, and frequent dieting among male and female adolescents.

METHODS. A prospective study was conducted with an ethnically and socioeconomically diverse sample of 2516 adolescents who completed surveys at both time 1 (1998–1999) and time 2 (2003–2004) of the Project EAT (Eating Among Teens) study.

RESULTS. In 1998–1999, approximately one fourth of participants reported being teased about their weight at least a few times a year. After adjustment for age, race/ethnicity, socioeconomic status (SES), and BMI, boys who were teased about their weight were more likely than their peers to initiate binge eating with loss of control and unhealthy weight control behaviors 5 years later. The predicted prevalence for incident binge eating behaviors with loss of control among boys who were teased was 4.1% as compared with 1.4% for those who were not teased, after adjustment for age, race/ethnicity, SES, and BMI. For unhealthy weight control behaviors at time 2, the predicted prevalence was 27.5% among boys who were teased and 19.3% for boys who were not teased, after adjustment for age, race/ethnicity, SES, and BMI. Girls who were teased were more likely than their peers to become frequent dieters. The predicted prevalence for incident frequent dieting among girls who were teased was 18.2% as compared with 11.0% for those who were not teased, after adjustment for age, race/ethnicity, SES, and BMI.

CONCLUSIONS. Weight teasing in adolescence predicts disordered eating behaviors at 5-year follow-up. The patterns of these associations differ by gender. Reducing teasing through educational interventions and policies may reduce the level of disordered eating behaviors among youths.

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Key Words

adolescence, eating disorders, longitudinal study

Abbreviations

SES—socioeconomic status

OR—odds ratio

CI—confidence interval

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Weight-related teasing is prevalent among adolescents, with overweight youths reporting higher levels of weight-related teasing compared with their average-weight peers.^{1,2} Nineteen percent of average-weight adolescent girls and 13% of average-weight adolescent boys report being teased about weight at least a few times a year, whereas >45% of overweight girls and boys report this frequency of weight teasing.¹

An important question exists regarding the potential impact that this weight-related mistreatment may have on the weight-related behaviors of adolescents. Disordered eating behaviors have been shown to be prevalent among youths. The 2003 Youth Risk Behavioral Surveillance System, a national survey involving 15 240 students in 9th through 12th grades, found that almost 60% of female and 29% of male students were trying to lose weight.³ More than 13% of students reported fasting for a period of 24 hours or more in the past month to lose weight, and >11% of girls and 7% of boys reported taking diet pills, powders, or liquids in the past month.³ Eight percent of girls and close to 4% of boys reported vomiting or taking laxatives in the past month to lose weight.³ Project EAT (Eating Among Teens), a population-based survey of 4746 adolescents, found that unhealthy weight-control behaviors, including skipping meals, smoking cigarettes, fasting, eating very little, and using food substitutes, were reported by 57% of the girls and 33% of the boys.⁴ Binge eating in the past year was reported by >17% of girls and nearly 8% of boys surveyed in Project EAT.⁵ These behaviors are of public health concern because of their association with increased risk for eating disorders and obesity⁶⁻⁸ and their adverse effects to health and well-being.⁹⁻¹¹

Retrospective and cross-sectional studies have found a strong positive association between being teased about weight and disordered eating behaviors, including purging, binge eating, and fasting behaviors.^{1,2,12-14} Cross-sectional data from Project EAT found that, compared with youths who did not report frequent weight teasing, those who experienced frequent weight teasing had 2.0 times the odds of engaging in unhealthy weight-control behaviors and binge eating.¹ This association was similar for both male and female adolescents. Inferential limitations of these findings exist as a result of possible differential recall of past teasing events and the inability to determine the temporal ordering of teasing and disordered eating behaviors.

The prospective studies that have investigated the effects of teasing on the development of disordered eating behaviors have shown mixed results. Wetheim, Korrner, and Paxton¹⁵ found that teasing predicted subsequent increases in bulimic behaviors among adolescent girls. Gardner et al¹⁶ followed a sample of children aged 6-14 for 3 years, and observed that teasing predicted higher eating disorder scores among males but not females. Two other prospective studies found that weight-

related teasing was not related to subsequent purging behaviors¹⁷ nor to restrictive and bulimic behaviors¹⁸ among adolescent girls, after adjustment for other relevant factors.

The present study builds on previous research by examining whether weight-related teasing predicts binge eating, unhealthy weight-control behavior, and frequent dieting 5 years later, using longitudinal data from a socioeconomically and ethnically diverse sample of both male and female adolescents. We hypothesized that adolescents who reported weight teasing at time 1 would have an increased risk for disordered eating behaviors at follow-up than those who were not teased.

METHODS

Study Design

Project EAT-II is a follow-up study of Project EAT-I, an observational study that used self-report measures of the socioenvironmental, personal, and behavioral determinants of dietary intake and weight status among a large and ethnically diverse population.^{4,19} Project EAT-I surveyed 4746 middle and high school students in 31 Minnesota schools (of 55 recruited to participate) during the 1998-1999 academic year. Consent procedures for Project EAT-I were done in accordance with the requests of the participating school districts; in some schools, parents were required to return signed consent forms for their child's participation, and in others, parents were required to return forms only if they did not want their child to participate in the study.

Five years later, Project EAT-II aimed to resurvey original participants to examine changes in their eating patterns and weight status as they progressed from early adolescence to middle adolescence and from middle adolescence to late adolescence/young adulthood. To obtain consent in Project EAT-II, parents of adolescents who were younger than 18 years were sent a consent form before the surveys were mailed; surveys were not sent to adolescents whose parents mailed back a consent form indicating their refusal to have their child participate. Completion of the Project EAT-II survey implied written consent on behalf of the participants. Of the original study population, 1074 (22.6%) were lost to follow-up for various reasons, primarily missing contact information at EAT-I ($n = 411$) and no address found at follow-up ($n = 591$). Of the remaining 3672 participants who were contacted by mail, 2516 completed surveys, representing 53.0% of the original cohort and 68.4% of participants who were contacted for Project EAT-II. Study protocols were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee.

Sample Population

The final EAT sample consisted of 1386 female adolescents (55.1%) and 1130 male adolescents (44.9%) who

completed surveys for both EAT-I (time 1) and EAT-II (time 2). Approximately one third (32.0%) of the participants were in middle school during EAT-I (younger cohort); at time 1 their mean age was 12.8 years (SD: 0.8), and at time 2, their mean age was 17.2 years (SD: 0.6). Two thirds (68.0%) of the participants were in high school during EAT-II (older cohort); at time 1, their mean age was 15.8 years (SD: 0.8), and at time 2, their mean age was 20.4 years (SD: 0.8).

Attrition in the sample population was not equal across demographic characteristics. Adolescents who completed the survey in EAT-I and EAT-II were more likely to be white (66% vs 34%) and of higher socioeconomic status (SES; 44% vs 29%) than those who were lost to follow-up. This differential attrition by demographic characteristics was addressed by propensity weighting (see Data Analysis). No significant differences were observed among participants who completed the EAT survey at both time points and those who were lost to follow-up regarding time 1 frequent teasing, binge eating with loss of control, and frequent dieting. Participants who were followed at both time points were slightly less likely to engage in unhealthy weight-control behaviors (44% vs 50%) at time 1 as compared with those who were lost to follow-up.

Survey Tools and Data Collection

The Project EAT-I survey was revised for use in Project EAT-II. Two versions were developed for Project EAT-II: 1 for younger adolescents of high school age and 1 for older adolescents/young adults who were out of high school. Approximately two thirds of the items in the high school version and 55% of the items in the older adolescent/young adult version remained as they were in the original survey or with minor alterations (eg, change in response options for age).

Surveys were sent by mail to the address provided by the participant during EAT-I. Internet tracking services were used to identify correct addresses when mail was returned. Nonresponders were sent 2 reminder postcards and 3 additional survey packets. Data collection ran from April 2003 to June 2004.

Measures

Weight-related teasing was the key predictor variable in these analyses. Frequency of weight-related teasing was assessed with the item, "How often did any of the following things happen to you: You are teased about your weight." Response categories were (1) never, (2) less than once a year, (3) a few times a year, (4) a few times a month, and (5) at least once a week. Those who reported being teased a few times a year or more were considered to have experienced frequent weight teasing.

Three measures of disordered eating behaviors at time 2 were considered as outcome variables. Binge eating with loss of control was assessed with 2 questions

(yes/no for each question): "In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge eating)? During the times when you ate this way, did you feel you couldn't stop eating or control what or how much you were eating?" Respondents who answered affirmatively to both of these questions were classified as engaging in binge eating with loss of control. Unhealthy weight-control behaviors were assessed with the question, "Have you done any of the following things to lose weight or keep from gaining weight in the past year? (yes or no for each method)." The Cronbach's α for this measure was .7. Respondents who reported at least 1 of the following were classified as using unhealthy weight-control behaviors: fasted, ate little food, used a food substitute (eg, slim fast), used laxatives, skipped meals, smoked more cigarettes, took diet pills, made myself vomit, and used diuretics. Frequent dieting was assessed with the question, "How often have you gone on a diet during the last year?" Diet was defined as "changing the way you eat so you can lose weight." Responses were (1) never, (2) 1 to 4 times, (3) 5 to 10 times, (4) >10 times, and (5) I am always dieting. Frequent dieting was defined as going on a diet 5 or more times a year.

Several additional characteristics were considered as covariates in this study. BMI at time 2 was based on self-reported height and weight measures and calculated with the formula weight in kilograms divided by squared height in meters. The correlations between reported and measured BMI at time 1 were $r = .85$ for female adolescents and $r = .89$ for male adolescents.²⁰ Gender, ethnicity/race, age, and SES were based on self-report at time 1. Ethnicity/race was assessed with the question, "Do you think of yourself as (1) white, (2) black/African American, (3) Hispanic or Latino, (4) Asian American, (5) Hawaiian/Pacific Islander, or (6) American Indian?" For ensuring sufficient power for multivariable analyses, respondents were grouped as white or nonwhite. Level of SES was based primarily on the highest educational level completed by either parent for most respondents. Other factors that were taken into account in assessing SES included eligibility for public assistance, eligibility for free or reduced-cost school meals, and parental employment status.¹⁹

Data Analysis

To account for differential response rates across demographic characteristics in the longitudinal sample, in all analyses, the data were weighted using the response propensity method,²¹ whereby the inverse of the estimated probability that an individual responded at time 2 is used as the weight. Response propensities (ie, the probability of responding to the EAT-II survey) were estimated using a logistic regression of response to EAT-II (yes/no) on a large number of predictor variables available from the EAT-I survey (time 1 survey). The

selected response propensity model included main effects for baseline gender, native born, ethnicity/race, SES, overweight status, parental marital status, individual's concern about health, and most common grade in school. The weighting method results in estimates that are representative of the demographic makeup of the original Project EAT-I sample. The weighted ethnic/racial and SES proportion are 48.5% white, 19.0% black, 19.2% Asian, 5.8% Hispanic, 3.5% Native American, and 3.9% mixed or other race. Thirty-seven percent of the sample were of low or low-middle SES.

Multiple logistic regression was used to examine the association between time 1 teasing and time 2 disordered eating behaviors. Two models examined this association: model 1 was adjusted for race/ethnicity, SES, and age; in model 2, BMI at time 2 was added to control for known associations between BMI and each outcome behavior.^{1,4} All analyses were stratified by gender. Differential effects of weight teasing on disordered eating behaviors by age cohort (ie, the younger and older cohorts) were examined by testing interactions between age cohort and weight teasing. Findings indicated similar patterns of association between age cohorts. Thus, interactions were not taken into account in additional analyses. To provide a point of reference for the odds ratio (OR) estimates, the predictive prevalence for each outcome behavior was calculated for those who were frequently teased and for those who were not. Robust standard errors were used to account for increased variance as a result of weighting. STATA 8 was used for all analyses.²²

For identification of development of a behavior subsequent to frequent teasing, only participants who were not engaging in the relevant outcome behavior at time 1 were eligible for each analysis. Thus, 1176 female and 1053 male adolescents were included in the analysis that predicted binge eating with loss of control, 604 female and 801 male adolescents were included in analysis of unhealthy weight-control behaviors, and 1135 female and 1051 male adolescents were included in the analysis of frequent dieting.

RESULTS

Weight Teasing and Disordered Eating Behaviors

At time 1, 23% of female and 21% of male adolescents reported being teased about their weight at least a few

times a year. More female than male adolescents developed disordered eating behaviors over the study period ($\chi^2 = 6.65, P = .01$; Table 1). At time 2, 100 female and 26 male adolescents had begun to binge eat with loss of control (ie, reported binge eating with loss of control at time 2 but not at time 1). Unhealthy weight-control behaviors were initiated by 268 female and 171 male adolescents. A total of 153 female and 52 male adolescents had begun to diet 5 times per year or more.

Weight Teasing and Subsequent Disordered Eating Behaviors

Weight teasing was predictive of binge eating with loss of control at 5 years of follow-up among both female and male adolescents after adjustment for age, race/ethnicity, and SES (Table 2). When BMI at time 2 was added to the model, the association remained significant among males (OR: 3.0; 95% confidence interval [CI]: 1.1–8.1) and was marginally significant among female adolescents.

Frequent weight teasing was not predictive of incident unhealthy weight-control behaviors among female adolescents but was predictive of these behaviors among male adolescents (OR: 1.7; 95% CI: 1.1–2.7), adjusted for age, race/ethnicity, and SES. When BMI at time 2 was added to the model, the association between teasing and unhealthy weight-control behaviors among male adolescents was attenuated but remained significant. For male adolescents, the predicted prevalence for incident unhealthy weight-control behaviors was 27.5% among those who were teased and 19.3% for those who were not teased, after adjustment for age, race/ethnicity, SES, and BMI. We also investigated whether the association of teasing and weight-control behaviors differed by the severity of the behavior and found that, among female adolescents, teasing was not predictive of incident cases of either extreme (defined as the following: made myself vomit, used diuretics, took diet pills, and used laxatives) or less extreme weight-control behaviors (defined as the following: used food substitute, smoked more cigarettes, fasted, ate very little food, skipped meals), after adjustment for age, race/ethnicity, SES, and BMI. Among male adolescents, teasing was predictive of incident cases of the less extreme behaviors (OR: 1.7; 95% CI: 1.1–2.7) but not the extreme behaviors (OR: 1.1; 95% CI: 0.5–

TABLE 1 Incident Cases of Disordered Eating Behavior Among Female and Male Adolescents in the Project EAT Study

	Female Adolescents		Male Adolescents	
	No. Not Engaging in Behavior, Time 1	No. (%) ^a Who Develop Behavior, Time 2	No. Not Engaging in Behavior, Time 1	No. (%) ^a Who Develop Behavior, Time 2
Binge eating with loss of control	1176	100 (9)	1053	26 (3)
Unhealthy weight-control behaviors	604	268 (44)	801	171 (21)
Frequent dieting	1135	153 (14)	1051	52 (5)

^a Denominator for percentage is those who were not engaging in disordered eating behavior at time 1.

TABLE 2 Frequent Weight Teasing as a Predictor of Disordered Eating Behaviors Among Female and Male Adolescents in the Project EAT Study^a

	Binge Eating With Loss of Control		Unhealthy Weight-Control Behaviors		Frequent Dieting	
	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b
Female adolescents						
Weight teasing, OR (95% CI)	1.6 (1.0–2.6)	1.3 (0.9–2.1)	1.0 (0.6–1.6)	1.2 (0.7–1.8)	1.9 (1.3–2.9)	1.8 (1.2–2.7)
Predicted prevalence, %						
No weight teasing	7.9	7.9	46.1	51.4	10.8	11.0
Weight teasing	11.9	9.8	45.6	54.9	19.0	18.2
Male adolescents						
Weight teasing, OR (95% CI)	4.2 (1.7–10.0)	3.0 (1.1–8.1)	1.7 (1.1–2.7)	1.6 (1.0–2.6)	1.3 (0.6–2.6)	1.1 (0.5–2.3)
Predicted prevalence, %						
No weight teasing	1.6	1.4	18.8	19.3	4.8	4.8
Weight teasing	6.2	4.1	28.2	27.5	6.0	5.2

Statistically significant ORs are in bold type.

^a Model 1 includes time 1 teasing, age, race/ethnicity, and SES.

^b Model 2 includes time 1 teasing, age, race/ethnicity, SES, and BMI at time 2.

2.1), after adjustment for age, race/ethnicity, SES, and BMI.

After adjustment for age, race/ethnicity, SES, and BMI, frequent weight teasing was predictive of incident frequent dieting among female adolescents (OR: 1.8; 95% CI: 1.2–2.7) but not among male adolescents. The predicted prevalence for incident frequent dieting among female adolescents who were teased was 18.2% as compared with 11.0% for those who were not teased, after adjustment for age, race/ethnicity, SES, and BMI.

DISCUSSION

The present study followed a large, population-based sample of male and female adolescents for 5 years to examine the associations between weight-related teasing and subsequent disordered eating behaviors. We observed that weight teasing predicted disordered eating behaviors 5 years later, although the pattern of these associations differed somewhat by gender.

Weight teasing was significantly positively associated with the development of binge eating with loss of control among male adolescents, and the association was marginally significant among female adolescents. That weight teasing is a predictor of binge eating among adolescents is noteworthy as binge eating behavior has been identified as a risk factor for obesity²³ and may be a precursor for bulimia nervosa.²⁴ This finding of an association between teasing and binge eating is consistent with findings from cross-sectional data from Project EAT-I¹ and with results from a study by Brown et al,²⁵ who compared a sample of female binge-purgers with a matched group of control subjects and found that binge-purgers were more likely than control subjects to report being teased or rejected because of appearance during childhood.

Prospective research that investigated risk factors for binge eating that was conducted by Stice et al²⁶ provides insight into how teasing about weight may lead to sub-

sequent binge eating behavior. Stice et al found that, in addition to other factors, depressive symptoms and dieting predicted binge-eating behavior in adolescent girls. Although teasing was not assessed in the study by Stice et al, their findings suggest potential theoretical links between teasing and disordered eating behaviors. It is possible that teasing about weight may result in depressive symptoms, which in turn lead to binge-eating behavior. Alternatively, being teased about weight may cause an individual to diet in attempt to avoid future weight-related stigmatization, which then may lead to binge-eating behavior. Analysis of these pathways is beyond the scope of the present study; however, future prospective research, involving measurements at multiple time points, could test potential mediators of the relationship between weight-related teasing and disordered eating behaviors to elucidate further this association and to help to identify potential targets for prevention.

Associations of weight teasing and unhealthy weight-control behaviors and teasing and frequent dieting also differed by gender. Weight teasing was not predictive of unhealthy weight-control behaviors among female adolescents but was among male adolescents. Among female adolescents, weight teasing was significantly associated with the development of frequent dieting, but among male adolescents there was no association between teasing and frequent dieting.

Our observation that the association between weight teasing and unhealthy weight-control behaviors differed by gender supports findings from Gardner et al¹⁶ and from previous cross-sectional analysis from Project EAT-I that found that being teased about weight was positively associated with unhealthy weight-control behaviors among male but not female adolescents, after other factors, such as family and peer weight-related norms, were included in the predictive model.²⁷ It is possible that because female adolescents receive more

messages about achieving the “thin ideal” from a larger range of sources than their male counterparts, weight teasing does not explain independently as much of the variance in these behaviors in female adolescents as it does in male adolescents.

Our findings that weight teasing did not predict unhealthy weight control behaviors among females differed from the previous prospective study by Wertheim, Koerner, and Paxton¹⁵ that found a positive association between teasing and bulimic behaviors. One potential explanation for this variation is that this previous study had a follow-up period of 8 months. It is possible that for many individuals weight teasing has a more proximal effect on disordered eating behaviors than would be detected with a 5-year follow-up. A second possible explanation for this variation in results is that the measures used to assess disordered eating behaviors differed among the studies.

Strengths of the current study that enhance our ability to draw conclusions from the findings include the prospective study design, which is preferable to cross-sectional or retrospective studies in that there is reduced likelihood of differential recall of past events and reverse causal inference. A second strength of the study that improves our ability to generalize our findings to a broad population of adolescents is the large ethnically and socioeconomically diverse sample of both male and female adolescents. We are unaware of any other prospective studies that have examined the association between weight-related teasing and disordered eating behaviors among a socioeconomically and ethnically diverse sample of both male and female adolescents.

Limitations of this study should also be considered in interpreting the findings. First, although multiple attempts were made to reach original sample, study attrition may introduce bias to the findings. Compared with the original sample, adolescents who completed both the baseline and follow-up surveys were more likely to be white and in the upper SES categories. Sampling weights correcting for nonresponse bias were used in all analyses to help address this limitation. Second, the wording of the disordered eating measures (behavior in the past year) resulted in a conservative estimate of new cases of disordered eating over the follow-up period. This conservative measure likely resulted in misclassification of some participants. This misclassification likely biased results toward the null and may account for some of the null findings. Third, this study used brief survey measures of disordered eating behavior; it would have been preferable to assess these behaviors with an interview to improve validity of the measures.

Implications

Findings from the current study have implications for the design of future research studies. Although this study had the advantage of determining the long-term

effect of teasing on disordered eating behaviors, longitudinal studies with multiple time points and shorter follow-up periods than used in this study would help to elucidate the proximal effects of teasing on disordered eating behaviors. Second, results from experimental research, such as community-based trials, that can test whether reducing the level of teasing results in decreased disordered eating behaviors over time would provide stronger evidence of causality than can be achieved with prospective studies.

Our findings also have implications for the development of prevention interventions. The finding that being teased about weight in adolescence may increase risk for the later development of disordered eating behaviors among both male and female adolescents points to the need for the implementation of clear no-teasing policies at schools and community-based organizations that serve youths. In addition, intervention programs that are focused on reducing verbal harassment and improving conflict resolution and communication skills among youths should be developed and evaluated in these settings.

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Weight Teasing and Disordered Eating Behaviors in Adolescents: Longitudinal Findings From Project EAT (Eating Among Teens)

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