HHS Public Access

Author manuscript

Prev Med. Author manuscript; available in PMC 2018 July 01.

Published in final edited form as:

Prev Med. 2017 July ; 100: 173–179. doi:10.1016/j.ypmed.2017.04.023.

Experiences of Weight Teasing in Adolescence and Weight-related Outcomes in Adulthood: A 15-year Longitudinal Study

Rebecca M. Puhl, PhD[1], **Melanie M. Wall, PhD**[2], **Chen Chen, MPH**[2], **S. Bryn Austin, ScD**[3], **Marla E. Eisenberg, ScD, MPH**[4], and **Dianne Neumark-Sztainer, PhD, MPH, RD**[5]

[1]Rudd Center for Food Policy & Obesity, and Department of Human Development and Family Studies, University of Connecticut, Hartford, CT

[2]Department of Biostatistics, Mailman School of Public Health, Columbia University, New York City, NY

[3]Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, and Division of Adolescent and Young Adult Medicine, Boston Children's Hospital, Boston, MA

[4]Division of General Pediatrics and Adolescent Health, Department of Pediatrics, University of Minnesota, Minneapolis, MN

[5]Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, MN

Abstract

Weight-based teasing is common among youth, but little is known about its long-term impact on health outcomes. We aimed to 1) identify whether weight-based teasing in adolescence predicts adverse eating and weight-related outcomes 15 years later; and 2) determine whether teasing source (peers or family) affects these outcomes. Data were collected from Project EAT-IV (Eating and Activity in Teens and Young Adults) (N=1830), a longitudinal cohort study that followed a diverse sample of adolescents from 1999 (baseline) to 2015 (follow-up). Weight-based teasing at baseline was examined as a predictor of weight status, binge eating, dieting, eating as a coping strategy, unhealthy weight control, and body image at 15-year follow-up. After adjusting for demographic covariates and baseline body mass index (BMI), weight-based teasing in adolescence predicted higher BMI and obesity 15 years later. For women, these longitudinal associations occurred across peer and family-based teasing sources, but for men, only peer-based teasing predicted higher BMI. The same pattern emerged for adverse eating outcomes; weight-based teasing from peers and family during adolescence predicted binge eating, unhealthy weight control, eating to cope, poor body image, and recent dieting in women 15 years later. For men, teasing had fewer longitudinal associations. Taken together, this study shows that weight-based

Please address all correspondence to: Rebecca Puhl, PhD, Rudd Center for Food Policy & Obesity,University of Connecticut, One Constitution Plaza, Suite 600, Hartford, CT 06103, Phone: 860-380-1209, Rebecca.puhl@uconn.edu.

Conflicts of interest: None

teasing in adolescence predicts obesity and adverse eating behaviors well into adulthood, with differences across gender and teasing source. Findings underscore the importance of addressing weight-based teasing in educational and health initiatives, and including the family environment as a target of anti-bullying intervention, especially for girls.

Introduction

Weight-based teasing and bullying (also called weight-based victimization) have been identified as common experiences for youth, particularly for those with higher body weight.[1–3] Reports from students, parents, and teachers suggest that body weight is viewed to be the most common reason that youth are teased and bullied.[4–6] Longitudinal research has demonstrated that weight-based teasing is prevalent throughout adolescence,[7] and may remain consistent during the transition into adulthood.[8]

Given high rates of overweight and obesity in youth,[9] and their vulnerability to weight-based victimization, it is critical to identify how these teasing experiences may influence health outcomes, especially weight-related health. While evidence consistently demonstrates links between weight-based victimization and negative health behaviors, disordered eating, and poorer emotional wellbeing,[10–14] few studies have examined longitudinal associations between weight-based teasing and health outcomes in adulthood.[15] To date, the limited prospective evidence in this area has examined 5–10 year consequences of early experiences of weight-based teasing on emotional wellbeing (e.g., body image, depressive symptoms, self-esteem), disordered eating, or weight-control behaviors in adolescence and early adulthood.[16–18] This evidence importantly demonstrates that weight-based teasing may have an adverse impact on emotional wellbeing and maladaptive eating patterns that persists into late adolescence and young adulthood. However, important questions remain.

First, it is important to broaden existing knowledge about the long-term implications of weight-based teasing for weight-related health outcomes. In addition to identifying whether early experiences of weight-based teasing predict maladaptive eating behaviors (such as binge eating and unhealthy weight control) further into adulthood, it is important to identify the potential long-term influence of early teasing experiences on other relevant eating behaviors and weight-related outcomes that can affect health, such as eating to cope with emotional distress, unhealthy dieting, and weight status. Cross-sectional evidence has demonstrated links between weight-based victimization and a range of unhealthy behaviors,[10,13] while longitudinal work has observed that exposure to general peer-based bullying (not specific to weight) in childhood or adolescence may increase risk for future obesity,[19–21] and certain age-related diseases in adulthood.[19] However, it is important to identify longitudinal associations and the direction of causal pathways linking youth experiences of weight-specific victimization to adverse eating behaviors and weight-related outcomes that may persist well into adulthood.

Second, is not known whether experiencing weight-based teasing from peers versus family members differentially affects adverse eating and weight-related outcomes in adulthood. While evidence shows that youth with overweight or obesity are vulnerable to weight-related teasing and stigma from both peers and parents,[2,3] it is not clear whether the long-term

impact of these experiences is attenuated or worsened depending on the perpetrator of the teasing. Identifying potential differences in long-term outcomes based on the source of early teasing experiences has important implications for targets (e.g., peers, families) and settings (e.g., schools, home) of intervention and prevention efforts to address weight-based victimization.

To address these important and understudied areas, the present study builds upon previous work to examine whether experiences of weight-based teasing in adolescence predict weight status and adverse eating and weight-related health behaviors 15 years later; and whether the source of early weight-based teasing (from peers, parents, or both) differentially affect these outcomes in adulthood. We examined these questions using the most recent (4th) wave of longitudinal data from Project EAT (Eating and Activity in Teens and Young Adults), an ethnically and socioeconomically diverse sample of males and female adolescents followed for 15 years through young adulthood. Several studies using previous waves of data drawn from Project EAT have assessed longitudinal and secular trends in weight-based teasing in adolescence[7,8] and examined concurrent teasing experiences by family members in adulthood.[16] However, the long-term health and weight-related outcomes occurring from weight-based teasing in adolescence have not yet been studied, nor have potential differences in these longitudinal outcomes according to the source of weight-based teasing (peers versus family). Examining these questions in the recently completed 4th wave of Project EAT provides an important opportunity to address these gaps in knowledge and contribute novel insights about the nature and potential long-term impact of weight-based teasing experiences in youth.

Methods

Study Design and Population

Data for this study were drawn from Project EAT-IV, a 15-year longitudinal study examining behavioral, psychological, and socioenvironmental factors related to dietary intake and weight-related outcomes in adolescents. The analytic sample includes 1,830 participants who responded at baseline (1998–1999)[22,23] and in the fourth study wave (2015–2016). The baseline population included 4,746 adolescents, drawn from 31 public middle schools and high schools in the Minneapolis-St. Paul metropolitan area. At baseline, participants completed surveys and anthropometric measurements at school. At 15-year follow-up (Project EAT-IV), data collection occurred from January 2015 to May 2016 and was conducted by Wilder Research in St. Paul, Minnesota (http://www.wilderresearch.org). The University of Minnesota's Institutional Review Board Human Subjects Committee approved all protocols used in Project EAT at each time point.

A total of 788 men and 1,042 women completed follow-up surveys that were determined to be valid and adequately complete for inclusion in analyses, representing 66.1% of the 2,770 participants who could be contacted. Most respondents (95.4%) completed the survey online, the remainder a printed version. At baseline, participants were in early-to-mid adolescence (mean age = 14.9±1.7 years) and at follow-up they had a mean age of 31.0±1.7 years. Of participants who completed the survey, 56 (3.1%) were excluded for missing data on the primary teasing variable, resulting in a final sample of 1,774 adult respondents.

Survey Development

To allow for longitudinal comparisons, key items from the baseline survey were retained on the follow-up survey. Scale psychometric properties were examined in the follow-up survey sample and estimates of item test-retest reliability were determined in a subgroup of 103 participants who completed the survey twice within a period of one to four weeks. Test-retest reliability for the baseline measures was also assessed in a diverse sample of 161 adolescents over a 2-week period.[23]

Measures

Weight-based teasing in adolescence was the key predictor variable in this study, and was assessed at baseline by asking participants "Have you ever been teased or made fun of by other kids because of your weight?" (test-retest Kappa = 0.59) and "Have you ever been teased or made fun of by family members because of your weight?" (test-retest Kappa = 0.78). These items were used to create a 4-category predictor variable which included weight-based teasing from peers only, family members only, both peers and family members, or no teasing from peers and family.[24]

Six measures of eating and weight-related health served as follow-up outcome variables:

Weight status—The correlations between reported and measured body mass index (BMI; kg/m^2) at baseline, both assessed in the total adolescent sample, were r =.85 for female adolescents and r = .89 for male adolescents.[25] Additionally, self-report of height and weight (test-retest r=0.95 for height and r=0.98 weight) were previously validated in the cohort at 10-year follow-up in a subsample of 63 male and 62 female participants for whom height and weight measurements were completed by trained research staff. Results showed very high correlations between self-reported BMI and measured BMI in males (r=0.95) and females (r=0.98).[26,27] Our analyses used measured BMI from baseline. At follow-up, self-reported height and weight measures were used to calculate BMI, and participants were then classified as having a BMI > 30 (obese) or < 30 using clinical guidelines produced by the Centers for Disease Control.[28]

Binge eating—Binge eating was assessed by asking participants two questions (yes/no responses): "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)?" and "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?"[29] Respondents who answered affirmatively to both of these questions were classified as engaging in binge eating with loss of control (test-retest agreement = 94%). Those who responded affirmatively to only the first question were classified as embarrassed about overeating.

Eating as a Coping Strategy—Participants completed the 5-item Coping Subscale of the Motivations to Eat Measure,[30] which asks participants how often they engage in coping motivations to eat (including eating because of feeling depressed or sad, worthless or inadequate, as a way to cope, comfort him/herself, and distract him/herself). Response

choices included ‘almost never or never’, ‘rarely’, ‘sometimes’, ‘often’, ‘almost always or always’ (α = 0.93; test- retest reliability = 0.76).

Unhealthy weight control—Participants were asked “Have you done any of the following things in order to lose weight or keep from gaining weight during the past year?” Yes/No). Respondents who reported at least one of the following were classified as using unhealthy weight control behaviors: fasted, ate very little food, used a food substitute (e.g., powder or special drink), used laxatives, skipped meals, smoked more cigarettes, took diet pills, induced vomiting, and used diuretics)[23] (α = 0.70; test-retest agreement = 86%). Participants who reported induced vomiting, use of diuretics, laxatives, or food substitutes were further classified as engaging in “extreme” unhealthy weight control behaviors (α = 0.50), whereas those who reported fasting, eating little food, skipping meals, smoking cigarettes or taking diet pills were classified as engaging in “less extreme” unhealthy weight control behaviors (α = 0.69).

Body Satisfaction—Participants completed a modified version of the Body Shape Satisfaction Scale[31] were asked how satisfied they were with 13 different parts of their body (height, weight, body shape, waist, hips, thighs, stomach, face, body build, shoulders, muscles, chest, overall body fat), on a 5-point scale from ‘very dissatisfied’ to ‘very satisfied’ (α = 0.93; test-retest reliability = 0.82).

Dieting—Participants were asked “Have you gone on a diet to lose weight during the last year?” (Yes/No) (test-retest agreement = 92%).

Statistical Analysis

Associations of demographic measures with weight-based teasing at baseline were tested using chi-square (for categorical) and t-tests (for continuous). Frequencies and means of follow-up weight-related health outcomes were summarized within each of the four weight-based teasing categories (Never teased, Teased by peers only, Teased by family only, and Teased by peers and family). These summaries were stratified by gender, and bivariate associations were tested using chi-square and one-way ANOVA. Prospective prediction of follow-up weight-related health outcomes by baseline weight-based teasing were tested using logistic regression (dichotomous outcomes: BMI over 30, embarrassed about overeating, binge eating, unhealthy weight control behaviors, and dieting) and linear regressions (continuous outcomes: BMI, body image, and eating as a coping strategy) controlling for age, race/ethnicity, SES and baseline categorical weight status. Those who were not teased comprised the reference group in all models.

Analyses of weight status outcomes excluded women who were pregnant or breastfeeding at follow-up (n=162) but they were included for other health outcomes. Because attrition from the baseline sample was not random, data were weighted with the inverse of the estimated probability that an individual responded at both baseline and follow-up, allowing for extrapolation back to the original school-based sample.[32] All analyses were conducted in SAS software (version 9.4, 2013; SAS, Inc., Cary, NC). Statistical significance was set at alpha < 0.05.

Results

Table 1 presents demographic characteristics of the sample by baseline experiences of weight-based teasing among participants at baseline who were followed 15 years later. There were no age differences at baseline or follow-up regarding teasing experiences reported by participants. At baseline, a higher percentage of adolescent girls (45.1%) reported experiencing weight-based teasing than adolescent boys (37.1%). Weight-based teasing from both peers and family members was reported by 14.5% adolescent girls and 9.4% boys. While similar percentages of adolescent girls (15.7%) and boys (13.6%) reported weight-based teasing from peers only, substantially more girls (14.9%) than boys (4.1%) reported weight-based teasing from family members only.

Frequency of Weight-related Outcomes Stratified by Baseline Teasing Experiences

Table 2 presents the frequency of weight-related outcomes at follow-up by type of teasing experienced at baseline. For adolescent girls, BMI, obese status, and unhealthy eating indicators differed by baseline teasing experiences. In general, adolescent girls reporting any teasing at baseline reported more adverse outcomes as adult women at follow-up than the group that was never teased about their weight. Among men, follow-up BMI and obese status differed by teasing experienced at baseline, as did a number of unhealthy eating indicators at follow-up. In general, adolescent boys who experienced teasing about their weight at baseline from peers and teasing by peers and family reported more adverse outcomes as adult men at follow-up than the other groups.

Weight Teasing and Subsequent Weight-related Outcomes for Women

After adjusting for baseline race/ethnicity, weight status, socioeconomic status, and age at follow-up, weight-based teasing from peers, family members, or both peers and family members at baseline were predictive of women having a higher BMI at follow-up (Table 3). Women had greater odds of being obese at follow-up if they had early experiences of weight-based teasing from peers (OR: 1.84; 95% CI: 1.08–3.12) or family (OR: 2.58; 95% CI: 1.57–4.26).

Early experiences of weight-based teasing predicted a number of adverse eating-related outcomes for women. Teasing experiences at baseline were predictive of eating as a coping strategy and as a way to comfort themselves at follow-up, regardless of whether the teasing came from peers, family, or both peers and family (Table 3). Women who reported weight-based teasing from both family and peers as adolescents at baseline had approximately 2 times greater odds of eating as a coping strategy (e.g., in response to feeling depressed and inadequate, or as a way to distract themselves from unpleasant things) at follow-up.

Weight-based teasing from both family and peers at baseline was predictive of women being embarrassed about eating too much food (OR: 1.77; 95% CI: 1.08–2.89), unhealthy weight control behaviors (OR: 2.15; 95% CI: 1.35–3.49), and having lower body satisfaction (ß: −4.81; 95% CI: −6.90– −2.73) at follow-up. Teasing from family members in adolescence also increased the odds of women reporting lower body satisfaction (ß: −3.03; 95% CI: −4.97–1.09) and dieting in the past year (OR: 1.61;95% CI: 1.05–2.47) at follow-up.

Weight Teasing and Subsequent Weight-related Outcomes for Men

Weight-based teasing from peers (but not family members) at baseline was predictive of men having a higher BMI (ß: 1.81; 95% CI: 0.82–2.81) and being obese (OR: 2.44; 95% CI: 1.48–4.01) at follow-up (Table 4). For eating-related outcomes, weight-based teasing from peers (but not family members) at baseline was predictive of eating as a way to cope (ß: 1.04; 95% CI: 0.14–1.94), as well as having lower body satisfaction (ß: −2.38; 95% CI: −4.60–0.15) at follow-up. No other outcomes at follow-up were predicted by baseline teasing experiences.

Discussion

This study followed a diverse sample of female and male adolescents for 15 years to examine longitudinal associations between early experiences of weight-based teasing and eating and weight-related outcomes as they entered their 30's. Findings showed that weight-based teasing predicted adverse eating and weight outcomes 15 years later, suggesting the importance of prevention work during adolescence aimed at reducing weight-related teasing. Some important differences across gender and the source of teasing were also identified, with implications for interventions.

Weight-based teasing in adolescence was significantly positively associated to maladaptive eating behaviors (e.g., eating as a coping strategy), body dissatisfaction, BMI, and obesity in adulthood. These findings build on previous work,[15–18, 33] establishing that health consequences of weight-based teasing extend further into adulthood than previously documented. Furthermore, with respect to body weight, our findings parallel prospective research with adult populations showing that perceived weight discrimination in adulthood predicts future obesity and weight gain.[34,35] Our study suggests that experiences of weight stigma that occur earlier in life (weight-based teasing in youth) may similarly have longitudinal associations with weight outcomes in adulthood.

Importantly, the present study offers novel insights about the source of weight-based teasing (family versus peers), which may have different implications for future eating and weight-related outcomes in women and men. For women, weight-based teasing in adolescence from family members, or from both family and peers, emerged as consistent predictors of unhealthy weight control behaviors, eating as a coping response to negative affect or emotional distress, dieting, and poorer body image in adulthood. In contrast, the opposite pattern occurred in men; being teased in adolescence by peers only (but not family members) predicted eating to cope, poorer body image, and obesity in adulthood. This pattern of results for men could in part be attributable to fewer boys than girls reporting weight-based teasing from family members in adolescence.

Based on these findings, more research is needed to examine the nature of weight-based teasing from family members, how girls and boys interpret and internalize these experiences, and the pathways through which family-based teasing may increase (or decrease) risk of future weight-related outcomes compared to peer-based teasing. It may be that sociocultural values of thinness and stringent ideals of female physical attractiveness increase girls' (but not boys') sensitivity to, or internalization of, weight-based teasing from family members in

ways that reinforce maladaptive eating behaviors that promote weight gain. A recent study found that girls who experienced negative weight labels (being called “too fat”), especially from parents, had increased odds of obesity 9 years later,[36] suggesting that parents who tell girls that their body size deviates from societal ideals may contribute to unhealthy weight outcomes in girls. Teasing may be a particularly harmful way in which family members communicate these messages, thus, our findings underscore the importance of examining differences in the nature and impact of weight-based teasing from family versus peers.

Finally, findings from our study raise important questions for future research that can help clarify the nature and impact of weight-based teasing in youth. In particular, it will be important to determine whether longitudinal health and weight-related outcomes are worse for overweight youth who experience weight-based teasing compared to overweight youth who are not teased. Furthermore, our findings showed that weight-based teasing was not limited to youth of high body weight; both boys and girls reported weight-based teasing from peers and family members across all weight categories (obese, overweight, normal weight, underweight) in adolescence. Thus, it will be informative for future research to examine and compare health outcomes emerging from weight-based teasing for girls and boys at different body weights.

Several limitations of this study should be considered in interpreting our findings. First, data collection relied on self-reported responses to brief survey measures, and more comprehensive assessment of eating behaviors and teasing experiences would improve measurement validity. Future research would benefit from more comprehensive measures to assess weight-based teasing from family versus peers, emotional responses to these different teasing sources, and internalization of teasing among youth. Second, we did not examine differences in pubertal status in adolescents at baseline assessment; it may be informative for future work to examine the relationship between pubertal maturation and weight status to help identify potential reasons for differential rates of weight-based teasing reported by adolescents of diverse body weights. Third, there was attrition from the study population, however results were weighted to allow for extrapolation back to the more representative original school-based sample. The present study also has a number of important strengths including the prospective research design with a 15-year duration, allowing for examination of the predictive nature of weight-based teasing over a significant and longer period of time than previous studies. The ethnically and socioeconomically diverse sample of females and males additionally improves the ability to generalize findings to broader groups of adolescents. Finally, our study examined novel predictors of adverse eating and weight outcomes in women and men, as we are unaware of any other longitudinal research that has compared weight-based teasing from family members versus peers.

Conclusions

Our findings have implications for programs targeting youth bullying and interventions addressing weight-related health. In addition to increasing awareness that weight-based teasing can have negative implications for future health outcomes, our findings suggest the need for broader anti-bullying initiatives that include both the school and family/home environment as targets for intervention. While most anti-bullying efforts occur in schools,

weight-based victimization is often absent in anti-bullying policy initiatives.[37] Furthermore, fewer initiatives address the family environment where weight teasing may be expressed in a manner that parents do not recognize as potentially harmful. Health professionals working with youth and families may have unique opportunities to assess youth for experiences of weight-based teasing, educate parents about the damaging health consequences of teasing, and offer families resources to support children and help them cope with weight-based teasing using healthy strategies. Public health interventions targeting obesity and/or promoting weight-related health may provide particularly relevant opportunities for education and increased public awareness about weight-based teasing and its harmful impact on body weight and health.

Acknowledgments

The authors would like to thank Nicole Larson for her input and reviews of previous drafts of this manuscript.

Financial disclosure: This study was supported by Grant Number *R01HL116892* from the National Heart, Lung, and Blood Institute (PI: Dianne Neumark-Sztainer). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Heart, Lung, and Blood Institute or the National Institutes of Health. S.B. Austin is supported by training grants T71-MC00009 and T76-MC00001 from the Maternal and Child Health Bureau, Health Resources and Services Administration, U.S. Department of Health and Human Services.

References

1. Bucchianeri MM, Eisenberg ME, Neumark-Sztainer D. Weightism, racism, classism, and sexism: Shared forms of harassment in adolescents. J Adolesc Health. 2013; 53(1):47–53. DOI: 10.1016/j.jadohealth.2013.01.006 [PubMed: 23566562]
2. Puhl RM, Latner J. Obesity, Stigma, and the Health of the Nation's Children. Psychol Bull. 2007; 133(4):557–580. DOI: 10.1037/0033-2909.133.4.557 [PubMed: 17592956]
3. Puhl RM, Peterson JL, Luedicke J. Weight-based victimization: bullying experiences of weight loss treatment-seeking youth. Pediatrics. 2013; 131:e1–9. DOI: 10.1542/peds.2012-1106 [PubMed: 23266918]
4. Puhl RM, Latner JL, O'Brien K, Luedicke JL, Forhan M, Danielstottir S. Cross-national Perspectives About Weight-Based Bullying in Youth: Nature, Extent, and Remedies. Pediatr Obes. 2015; 11(4):241–50. DOI: 10.1111/ijpo.12051 [PubMed: 26149218]
5. Bradshaw CP, Waasdorp TE, O'Brennan LM, Gulemetova M. Teachers' and Education Support Professionals' Perspectives on Bullying and Prevention: Findings From a National Education Association Study. School Psych Rev. 2013; 42(3):280–297. [PubMed: 25414539]
6. Puhl RM, Luedicke J, Heuer C. Weight-based victimization toward overweight adolescents: Observations and reactions of peers. J Sch Health. 2011; 81(11):696–703. DOI: 10.1111/j.1746-1561.2011.00646.x. [PubMed: 21972990]
7. Haines J, Neumark-Sztainer D, Hannan PJ, van den Berg P, Eisenberg ME. Longitudinal and secular trends in weight-related teasing during adolescence. Obesity. 2008; 16(S2):S18–S23. DOI: 10.1038/oby.2008.447 [PubMed: 18978758]
8. Haines J, Hannan PJ, van den Berg P, Eisenberg ME, Neumark-Sztainer D. Weight-related teasing from adolescence to young adulthood: Longitudinal and secular trends between 1999 and 2010. Obesity. 2013; 21(9):E428–434. DOI: 10.1002/oby.2009 [PubMed: 23585224]
9. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011 2012. JAMA. 2014; 311(8):806–814. DOI: 10.1001/jama.2014.732 [PubMed: 24570244]
10. Bucchianeri MM, Eisenberg ME, Wall MM, Piran N, Neumark-Sztainer D. Multiple types of harassment: Associations with emotional well-being and unhealthy behaviors in adolescents. J

Adolesc Health. 2014; 54(6):724–729. DOI: 10.1016/j.jadohealth.2013.10.205 [PubMed: 24411820]

11. Eisenberg ME, Neumark-Sztainer D, Story M. Associations of weight-based teasing and emotional well-being among adolescents. Arch Pediatr Adolesc Med. 2003; 157(8):733–738. DOI: 10.1001/archpedi.157.8.733 [PubMed: 12912777]
12. Lampard AM, Maclehose RF, Eisenberg ME, Neumark-Sztainer D, Davison KK. Weight-related teasing in the school environment: Associations with psychosocial health and weight control practices among adolescent boys and girls. J Youth Adolesc. 2014; 43(10):1770–1780. DOI: 10.1007/s10964-013-0086-3. [PubMed: 24395152]
13. Puhl RM, Suh Y. Health consequences of weight stigma: Implications for obesity prevention and treatment. Curr Obes Rep. 2015; 4(2):182–190. DOI: 10.1007/s13679-015-0153-z [PubMed: 26627213]
14. Juvonen J, Lessard LM, Schacter HL, Suchilt L. Emotional implications of weight stigma across middle school: The role of weight-based peer discrimination. J Clin Child Adolesc Psychol. 2016; 12:1–9. DOI: 10.1080/15374416.2016.1188703
15. Hubner C, Baldofski S, Crosby RD, Muller A, de Zwaan M, Hilber A. Weight-related teasing and non-normative eating behaviors as predictor of weight loss maintenance. A longitudinal mediation analysis. Appetite. 2016; 102:25–31. DOI: 10.1016/j.appet.2016.02.017 [PubMed: 26877218]
16. Eisenberg ME, Berge JM, Fulkerson JA, Neumark-Sztainer D. Associations between hurtful weight-related comments by family and significant other and the development of disordered eating behaviors in young adults. J Beh Med. 2012; 35(5):500–508. DOI: 10.1007/s10865-011-9378-9
17. Eisenberg ME, Neumark-Sztainer D, Haines J, Wall M. Weight-teasing and emotional well-being in adolescents: Longitudinal findings from Project EAT. J Adolesc Health. 2006; 38(6):675–683. DOI: 10.1016/j.jadohealth.2005.07.002 [PubMed: 16730595]
18. Haines J, Neumark-Sztainer D, Eisenberg ME, Hannan PJ. Weight-teasing and disordered eating behaviors in adolescents: Longitudinal findings from Project EAT (Eating Among Teens). Pediatrics. 2006; 117(2):e209–215. DOI: 10.1542/peds.2005-1242 [PubMed: 16452330]
19. Takizawa R, Danese A, Maughan B, Arseneault L. Bullying victimization in childhood predicts inflammation and obesity at mid-life: a five-decade birth cohort study. Psychol Med. 2015; 45:2705–2715. DOI: 10.1017/S0033291715000653 [PubMed: 25988703]
20. Mamun AA, O'Callaghan MJ, Williams GM, Najman JM. Adolescents bullying and young adults body mass index and obesity: A longitudinal study. Int J Obesity. 2013; 37:1140–1146. DOI: 10.1038/ijo.2012.182
21. Midei AJ, Matthews KA. Interpersonal violence in childhood as a risk factor for obesity: A systematic review of the literature and proposed pathways. Obes Rev. 2011; 12(5):e159–e172. DOI: 10.1111/j.1467-789X.2010.00823.x [PubMed: 21401850]
22. Neumark-Sztainer D, Story M, Hannan P, Moe J. Overweight status and eating patterns among adolescents: Where do youth stand in comparison to the Healthy People 2010 Objectives? Am J Pub Health. 2002; 92(5):844–851. DOI: 10.2105/AJPH.92.5.844. [PubMed: 11988458]
23. Neumark-Sztainer D, Croll J, Story M, Hannan PJ, French SA, Perry C. Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: findings from Project EAT. J Psychosom Res. 2002; 53(5):963–974. DOI: 10.1016/S0022-3999(02)00486-5 [PubMed: 12445586]
24. Thompson JK, Cattarin J, Fowler H, Fisher E. The Perception of Teasing Scale (POTS): a revision and extension of the Physical Appearance Related Teasing Scale (PARTS). J Pers Assess. 1995; 65:146–157. DOI: http://dx.doi.org/10.1207/s15327752jpa6501_11. [PubMed: 16367650]
25. Himes J, Neumark-Sztainer D, Hannan P, Wall M. Factors associated with errors in self-reports of stature, weight, and body mass index in Minnesota adolescents. Ann Epidemiol. 2005; 15(4):272–278. DOI: http://dx.doi.org/10.1016/j.annepidem.2004.08.010. [PubMed: 15780774]
26. Quick V, Wall M, Larson N, Haines J, Neumark-Sztainer D. Personal, behavioral and socio-environmental predictors of overweight incidence in young adults: 10-yr longitudinal findings. Int J Behav Nutr Phys Act. 2013; 10:37.doi: 10.1186/1479-5868-10-37 [PubMed: 23531253]

27. Sirard JR, Hannan P, Cutler GJ, Nuemark-Sztainer D. Evaluation of 2 self-report measures of physical activity with accelerometry in young adults. J Phys Act Health. 2013; 10(1):85–96. DOI: http://dx.doi.org/10.1123/jpah.10.1.85. [PubMed: 22241145]

28. Centers for Disease Control. Defining overweight and obesity: Overweight and Obesity. 2012. http://www.cdc.gov/obesity/adult/defining.html. Accessed September 16, 2016

29. Yanovski SZ. Binge eating disorder: Current knowledge and future directions. Obes Res. 1993; 1:306–324. [PubMed: 16350580]

30. Jackson B, Cooper ML, Mintz L, Albino A. Motivations to eat: Scale development and validation. Journal Res Personality. 2003; 37:297–318. DOI: 10.1016/S0092-6566(02)00574-3

31. Pringitore R, Spring B, Garfield D. Gender differences in body satisfaction. Obes Res. 1997; 5:402–409. [PubMed: 9385613]

32. Little RJA. Models for non-response in sample surveys. J Am Statist Assoc. 1982; 77:237–250.

33. Neumark-Sztainer DR, Wall MM, Haines JI, Story MT, Sherwood NE, van den Berg PA. Shared risk and protective factors for overweight and disordered eating in adolescents. Am J Prev Med. 2007; 33(5):359–369. DOI: 10.1016/j.amepre.2007.07.031 [PubMed: 17950400]

34. Sutin AR, Terracciano A. Perceived weight discrimination and obesity. PLoS ONE. 2013; 8(7):e70048.doi: 10.1371/journal.pone.0070048 [PubMed: 23894586]

35. Jackson SE, Beeken RJ, Wardle J. Perceived weight discrimination and changes in weight, waist circumference, and weight status. Obesity. 2014; 22:2485–8. DOI: 10.1002/oby.20891 [PubMed: 25212272]

36. Hunger JM, Tomiyama AJ. Weight labeling and obesity: a longitudinal study of girls aged 10 to 19 years. JAMA Pediatr. 2014; 168(6):579–80. DOI: 10.1001/jamapediatrics.2014.122 [PubMed: 24781349]

37. Puhl RM, Luedicke J, King KM. Public attitudes about different types of anti-bullying laws: Results from a national survey. J Public Health Policy. 2015; 36(1):95–109. DOI: 10.1057/jphp.2014.46 [PubMed: 25393213]

Highlights

- Weight-based teasing (WBT) in adolescence predicted obesity and higher BMI 15 years later
- WBT at baseline predicted unhealthy eating behaviors in both men and women at follow-up
- Teasing source (parents vs. peers) had a differential impact on outcomes across gender

Table 1

Demographics and baseline weight status by baseline weight-based teasing of participants followed 15 years later (N=1774)

	Not Teased *n* = *1114 (64.1%)*		**Teased by peers only *n* =*274 (14.6%)***		**Teased by family only *n* = *184 (9.4%)***		**Teased by peers & family *n* = *202 (11.9%)***		***P-value***
Categorical variables	***N*[a]**	***%*[a]**	***N***	***%***	***N***	***%***	***N***	***%***	
Gender									
Male	538	72.8	116	13.6	40	4.1	72	9.4	<.001
Female	572	54.9	158	15.7	143	14.9	128	14.5	
Social economic status									
Low	109	60.2	18	10.0	31	12.7	34	17.1	0.005
Low middle	163	62.9	40	15.9	21	7.2	37	14.1	
Middle	270	66.6	57	12.7	49	10.7	43	10.0	
High middle	343	65.2	100	17.9	46	7.6	55	9.4	
High	216	65.5	56	16.0	35	9.5	29	9.0	
Race/ethnicity									
White	771	63.2	205	16.3	116	8.8	132	11.7	0.058
Black or African	92	70.2	20	14.8	10	5.8	13	9.2	
American	36	62.8	7	10.5	7	11.	10	15.	
Hispanic or Latino						0		7	
Asian American	162	63.7	23	10.3	40	13.4	31	12.6	
American Indian or Native American	23	56.4	8	15.3	6	11.8	7	16.5	
Native Hawaiian, other Pacific Islander, other, or missing	30	61.9	11	16.5	5	8.4	9	13.1	
Baseline weight status									
Underweight	55	65.9	25	20.1	3	2.8	10	11.2	<.001
Normal weight	873	72.1	135	10.6	138	10.4	88	6.9	
Overweight	135	53.2	53	16.1	30	10.1	51	20.6	
Obese	40	29.4	55	33.3	13	6.7	47	30.6	
	Mean	*Std*	*Mean*	*Std*	*Mean*	*Std*	*Mean*	*Std*	
Age at baseline	14.9	1.6	15.0	1.5	14.9	1.7	15.0	1.5	0.506
Age at Follow-up	31.1	1.7	31.0	1.6	31.1	1.8	31.0	1.6	0.898

[a]N's are raw sample sizes, % are row percentages weighted by non-response propensity weights to reflect original Time 1 sample population

Table 2

Eating and weight-related outcomes at 15-year follow-up stratified by baseline weight-based teasing

	Weight-based Teasing Experiences at Baseline				
	Not Teased	***Teased: peers only***	***Teased: family only***	***Teased: peers and family***	
Follow-up outcomes	***Mean±SD or % (n)[a]***	***Mean±SD or % (n)***	***Mean± SD or % (n)***	***Mean± SD or % (n)***	***P-value****
FEMALES	***(n=572)***	***(n=158)***	***(n=143)***	***(n=128)***	
*Weight status***					
BMI change (Kg/m^2) ****	4.9 ± 4.6	5.8 ± 6.1	6.5 ± 5.0	5.8 ± 6.9	0.019*b*
Obese status (BMI > 30)	21.6 (92)	41.0 (49)	43.8 (49)	47.5 (45)	<.001*a b c*
Binge eating					
Embarrassed for eating too much food	21.7 (127)	27.9 (47)	28.5 (44)	33.2 (47)	0.042*c*
Binge eating	12.1 (72)	17.7 (29)	18.0 (27)	21.2 (29)	0.047*c*
Eating to cope (range=5–25)	9.5 ± 3.8	11.0 ± 4.3	10.8 ± 4.7	11.8 ± 5.2	<.001*a b c*
Extreme unhealthy weight control behaviors in the past year	22.0 (112)	24.4 (37)	27.5 (39)	34.4 (41)	0.042*c*
Less extreme unhealthy weight control behaviors in the past year	41.9 (220)	49.4 (72)	47.6 (63)	66.1 (77)	<.001*c e f*
Body satisfaction (range=13–65)	39.7 ± 9.8	38.3 ± 12.2	35.5 ± 9.3	33.2 ± 11.2	<.001*a, b, c*
Ever dieted (past year)	46.3 (258)	48.2 (78)	60.2 (74)	58.0 (72)	0.016[14]
MALES	(n=538)	(n=116)	(n=40)	(n=72)	
Weight status					
BMI change (Kg/m^2)	5.4 ± 4.2	6.1 ± 5.6	4.6 ± 2.5	4.7 ± 5.3	0.337
Obese status (BMI > 30)	24.2 (107)	48.9 (48)	19.5 (8)	37.8 (28)	<.001*a, c, d, e*
Binge eating					
Embarrassed for eating too much food	15.3 (79)	28.3 (29)	14.2 (6)	26.7 (22)	0.001*a, c, e*
Binge eating	6.9 (38)	14.2 (15)	8.8 (3)	11.9 (7)	0.039*a*
Eating to cope (range=5–25)	7.8 ± 4.5	9.4 ± 4.9	8.1 ± 4.1	8.5 ± 4.4	0.042*a*
Extreme unhealthy weight control behaviors in the past year	13.8 (70)	18.1 (16)	16.9 (7)	15.8 (13)	0.637

	Weight-based Teasing Experiences at Baseline				
	Not Teased	***Teased: peers only***	***Teased: family only***	***Teased: peers and family***	
Follow-up outcomes	***Mean±SD or % (n)[a]***	***Mean±SD or % (n)***	***Mean± SD or % (n)***	***Mean± SD or % (n)***	***P-value****
FEMALES	***(n=572)***	***(n=158)***	***(n=143)***	***(n=128)***	
Less extreme unhealthy weight control behaviors in the past year	34.0 (165)	43.4 (43)	30.9 (12)	28.2 (19)	0.119
Body satisfaction (range=13–65)	45.2 ± 11.8	40.4 ± 10.9	43.3 ± 8.4	38.7 ± 11.8	<.001[a, c]
Ever dieted (past year)	32.2 (158)	39.3 (47)	34.9 (13)	37.2 (30)	0.439

Note: Unadjusted means and percentages are weighted by non-response propensity weights to reflect original baseline sample

*p-value is a 3 degrees of freedom test for any difference in mean or *%* outcome across the 4 teasing categories.

**Women who were pregnant/breastfeeding were excluded from weight status outcomes; resulting sample sizes were 473 (Never teased), 136 (Teased: peers only), 120 (Teased; family only), 110 (Teased: peers & family)

***BMI Change refers to the increase in BMI across baseline and adulthood

*a,b,c,d,e,f*Difference lies between never teased vs. teased by peers only (a), never teased vs. teased by family only (b), never teased vs. teased by both peers and family (c), teased by only peers vs. teased by only family (d), teased by only peers vs. teased by both peers and family (e), or teased by only family vs. teased by both peers and family (f).

Table 3

Adjusted associations of weight-based teasing experiences at baseline with weight- related outcomes 15 years later – **Females**

	Weight-based Teasing Experiences at Baseline					
	Teased by peers only vs Not teased		Teased by family only vs Not teased		Teased by peers and family vs Not teased	
Follow-up Outcomes	**OR/B**	**95% CI**	**OR/B**	**95% CI**	**OR/B**	**95% CI**
Weight status						
BMI: *B*	**1.53**	**(0. 34–2.72)**	**1.6**	**(0.45–2.79)**	**1.35**	**(0.09–2.60)**
BMI over 30: OR	**1.84**	**(1.08–3.12)**	**2.58**	**(1.57–4.26)**	1.54	(0.89–2.64)
Binge eating: OR						
Embarrassed for eating too much food	1.28	(0.79–2.07)	1.51	(0.95–2.41)	**1.77**	**(1.08–2.89)**
Binge Eating	1.32	(0.74–2.36)	1.58	(0.91–2.76)	1.76	(0.99–3.12)
Eating to cope: B	**1.17**	**(0.33–2.02)**	**1.32**	**(0.50–2.15)**	**2.00**	**(1.11–2.89)**
Extreme unhealthy weight control behaviors in the past year: OR	0.94	(0.57–1.55)	1.34	(0.84–2.14)	1.46	(0.89–2.39)
Less extreme unhealthy weight control behaviors in the past year: OR	1.45	(0.94–2.23)	1.12	(0.73–1.70)	**2.29**	**(1.43–3.64)**
Body Satisfaction: B	−1.32	(−3.29–0.66)	**−3.03**	(**−4.97–−1.09**)	**−4.81**	(**−6.90–−2.73**)
Ever gone on a diet (past year): OR	1.00	(0.65–1.53)	**1.61**	**(1.05–2.47)**	1.37	(0.87–2.16)

NOTE: OR/B indicates odds ratio (for dichotomous outcomes) or beta (for continuous outcomes). OR = Odds ratios from logistic regression of dichotomous and ordered categorical outcomes at follow-up comparing each type of weight teasing at baseline to never teased at baseline (Reference group: Not teased female n=572). *B* = linear beta coefficient from linear regression of continuous outcomes (BMI, eating to cope and body satisfaction). Logistic and linear regressions control for age at follow-up, baseline social economic status, race/ethnicity and baseline weight status.

Table 4

Adjusted associations of weight-based teasing experiences at baseline with weight-related outcomes 15 years later **– Males**

	Weight-based Teasing Experiences at Baseline					
	Teased by peers only vs Not teased		Teased by family only vs Not teased		Teased by peers and family vs Not teased	
Follow-up Outcomes	**OR/B**	**95% CI**	**OR/B**	**95% CI**	**OR/B**	**95% CI**
Weight status						
BMI: *B*	**1.46**	**(0.53–2.40)**	−0.87	(−2.41–0.67)	−0.21	(−1.28–0.85)
BMI over 30: OR	**2.44**	**(1.48–4.01)**	0.86	(0.33–2.23)	0.86	(0.46–1.61)
Binge eating: OR						
Embarrassed for eating too much food	1.50	(0.90–2.51)	0.76	(0.28–2.04)	1.03	(0.56–1.89)
Binge Eating	1.02	(0.50–2.08)	0.98	(0.28–3.41)	0.77	(0.33–1.80)
Eating to cope: B	**1.04**	**(0.14–1.94)**	−0.01	(−1.49–1.46)	−0.37	(−1.43–0.69)
Extreme unhealthy weight control behaviors in the past year: OR	1.24	(0.71–2.18)	1.39	(0.55–3.52)	0.89	(0.44–1.78)
Less extreme unhealthy weight control behaviors in the past year: OR	1.39	(0.89–2.17)	0.86	(0.4–1.85)	**0.50**	**(0.28–0.88)**
Body Satisfaction: B	**−2.38**	**(−4.60–−0.15)**	−0.88	(−4.52–2.76)	−2.56	(−5.18–0.06)
Ever gone on a diet (past year): OR	1.21	(0.77–1.90)	1.21	(0.57–2.55)	0.93	(0.53–1.62)

NOTE: OR/B indicates odds ratio (for dichotomous outcomes) or beta (for continuous outcomes). OR = Odds ratios from logistic regression of dichotomous and ordered categorical outcomes at follow-up comparing each type of weight teasing at baseline to never teased at baseline (Reference group: Not teased male n=538). *B* = linear beta coefficient from linear regression of continuous outcomes (BMI, eating to cope and body satisfaction). Logistic and linear regressions control for age at follow-up, baseline social economic status, race/ethnicity and categorical baseline weight status.