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Family Meals and Disordered Eating in Adolescents: Are the Benefits the Same for Everyone?

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Abstract

Objective—To examine the association between family meals and disordered eating behaviors within a diverse sample of adolescents and further investigate whether family-level variables moderate this association.

Method—Data from adolescents (EAT 2010: Eating and Activity in Teens) and their parents (Project F-EAT: Families and Eating and Activity among Teens) were collected in 2009–2010. Surveys were completed by 2,382 middle and high school students (53.2% girls, mean age = 14.4 years) from Minneapolis/St. Paul, MN, public schools. Parents/guardians ($n = 2,792$) completed surveys by mail or phone.

Results—Greater frequency of family meals was associated with decreased odds of engaging in unhealthy weight control behaviors in boys, and dieting, unhealthy and extreme weight control behaviors in girls. Results indicate that the protective effects of family meals are, in general, robust to family-level variables; 64 interactions were examined and only seven were statistically significant. For example, among girls, the protective nature of family meals against dieting and unhealthy weight control behaviors was diminished if they also reported family weight-related teasing (both $p < .01$).

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Discussion—The results confirmed previous research indicating that participation in family meals is protective against disordered eating for youth, particularly girls. However, results suggest that in some cases, the protection offered by family meals may be modified by family-level variables.

Introduction

Disordered eating behaviors, such as self-induced vomiting, laxative use, and binge eating, are highly prevalent in youth^{1–3} and predictive of adverse physical and psychosocial outcomes.^{4–6} Thus, there is a need to identify potentially modifiable factors that contribute to the development of disordered eating in adolescents. The protective role of family meals against disordered eating behaviors among youth has been suggested by population-based cross-sectional,^{7–10} retrospective^{11,12} and prospective longitudinal studies,^{13,14} and qualitative investigations.^{15,16} However, it remains unclear whether the protective effect of family meals is the same for families with different family-level characteristics. For example, in homes in which family members talk negatively about food and eating, or in homes where the atmosphere at the family meal is not positive, does the protection of family meals against disordered eating behaviors diminish?

Previous research examining the association between family meal frequency and disordered eating behaviors in adolescents have adjusted for family-level variables, including family connectedness and adolescent enjoyment of family meals.^{8,13,17} Results of these studies have shown that family meals continue to offer protection against endorsement of disordered eating behaviors above and beyond the protection provided by a positive family environment, suggesting that there is something uniquely protective about the family meal experience.^{8,13,17} However, to our knowledge, only one study to date has examined how this protection might be moderated by family-level variables.¹⁴ This study by Haines et al. found that the protection offered by family meals remained, even when adolescents perceived their thinness to be of importance to their parents, weight-based teasing was normative in the home environment, and maternal dieting behaviors were reported.

The goal of the current study is to expand upon the extant research on family meals, by exploring a range of family-level variables that might moderate the association between family meal frequency and disordered eating behaviors. Research has demonstrated that “negative mealtime experiences,” including controlling food-related parenting practices and a negative atmosphere at family meals, and “negative familial interactions,” such as poor family functioning, high levels of weight and body talk, poor communication, and frequent weight teasing, are associated with disordered eating behaviors among youth.^{18–25} Understanding the role that this broad range of variables might play in the association between family meal frequency and adolescent use of disordered eating behaviors has important implications for physicians and other healthcare providers working with families of adolescents. On one hand, if the protective nature of family meals is robust to differences in family-level variables, frequent family meals can be recommended to all families without hesitation. On the other hand, if the protective nature of family meals is diminished or reversed in the presence of negative family-level variables, healthcare providers should make recommendations to improve the family meal environment, or suggest families

consider decreasing the frequency of family meals, at least until there are improvements in the harmful family-level variables.

The current study aims to answer the following research questions in a diverse population-based sample of adolescents: (a) Is family meal frequency associated with use of disordered eating behaviors? and (b) Do familial factors, including parent feeding practices, atmosphere at family meals, family functioning, parent-led conversations about weight, weight and body talk in the home, or family weight-related teasing, moderate the association between family meal frequency and use of disordered eating behaviors? (see Fig. 1 for graphic depiction of research questions.) Based on existing evidence from cross-sectional, retrospective, and prospective studies,^{7,12–14,26} it was hypothesized that greater frequency of family meals would be negatively associated with adolescent engagement in disordered eating behaviors, particularly in adolescent girls. Further, guided in part by prior work in this area,¹⁴ it was hypothesized that the presence of family factors noted in the literature to be associated with disordered eating, such as poor family functioning, frequent parent-led conversations about weight or body- and weight-related talk in the home, the occurrence of family weight-related teasing, high levels of controlling feeding practices, and a lack of adolescent enjoyment of family meals, would diminish, but not eliminate, the protection offered by family meals.

Method

Study Design and Population

Data for this analysis were drawn from two coordinated, population-based studies: EAT 2010 (Eating and Activity in Teens), a study of 2,793 adolescents, and Project F-EAT (Families and Eating and Activity Among Teens), a study of the parents ($n = 3,709$) of adolescents in EAT 2010. Additional details on these studies can be found elsewhere.^{27,28} All study procedures were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee and participating school districts.

For EAT 2010, surveys and anthropometric measures were completed by adolescents from the Minneapolis/St Paul metropolitan area of Minnesota during the 2009–2010 academic year. For Project F-EAT, data were collected by surveying up to two parents or caregivers of the adolescents in EAT 2010; approximately 30% of adolescents provided contact information for one parent or guardian and 70% provided information for two parents or guardians. Parent surveys were collected by mail and telephone interviews. Additional details on adolescent and parent participants can be found in Table 1.

The sample includes EAT 2010 participants who had at least one parent with whom they lived at least 50% of the time respond to the Project F-EAT questionnaire. Although data from up to two parents were collected in Project F-EAT, only data from one parent were included in the current study to ensure independence of data. In selecting one parent for inclusion, preference was given to parents who reported living with the adolescent most of the time; when youth lived equally with both parents, mothers were selected for inclusion because research indicates that women are more often in charge of the family meal environment.²⁹ The analytic sample consisted of 2,793 adolescents, 2,382 of whom had parental data available.

Survey Development and Measures

Both the EAT 2010 student survey and the Project FEAT parent survey underwent extensive pilot and test–retest reliability testing to ensure questions were appropriate for the intended audience. An initial draft of the EAT 2010 survey was pilot tested within a sample of 56 adolescents from diverse backgrounds to examine their understandability and relevance. This draft survey was additionally reviewed by a team of experts in the domains of nutrition, physical activity, adolescent development, body image, family relations, and urban design. After revisions based on initial pretesting and feedback from the expert reviewers, the survey was further pilot tested with a different sample of 129 middle school and high school students to examine the test–retest reliability of measures over a 1-week period and the internal consistency of scales. An initial draft of the Project F-EAT parent survey was first reviewed by content area experts to ensure that key constructs relevant to adolescent weight-related behaviors and outcomes were included. Furthermore, survey appropriateness for the major cultural groups participating in the study (i.e., Native American, Hmong, Latino, Somali, and African American groups) was addressed by having bi-cultural staff from the Wilder Research Foundation review the survey and provide feedback on the appropriateness and relevance of the survey items. Next, three focus groups were conducted to pretest an initial draft of the Project F-EAT survey. Feedback from 28 socioeconomically and ethnically/racially diverse parent participants was used to reword or eliminate problematic survey items and expand on topic areas of perceived importance (e.g., family meals, conversations about weight at home). An additional sample of 102 parents completed the Project F-EAT survey twice in a 2-week time period to examine test–retest reliability of survey questions. Finally, scale psychometric properties were examined within the full Project F-EAT sample. Data for the outcome variables (i.e., disordered eating behaviors) and the predictor variable (family meal frequency) were drawn from the EAT 2010 surveys completed by adolescent participants. Moderating variables were drawn from both the adolescent survey and Project F-EAT parent survey in an attempt to assess the broadest range of potential effect modifiers available within the datasets.

Outcome Variable: Disordered Eating

Adolescents reported their *dieting* frequency by responding to the question, “How often have you gone on a diet during the last year? By ‘diet’ we mean changing the way you eat so you can lose weight.” Response options included: never, 1–4 times, 5–10 times, more than 10 times, and I am always dieting. As in previous analyses, responses were dichotomized into nondieters (responded never) and dieters (other responses) (Test–retest agreement [nondieter versus dieter] = 82%).³⁰

Adolescents were asked about their use of *unhealthy and extreme weight control behaviors* with the question: “Have you done any of the following things in order to lose weight or keep from gaining weight during the past year?” (Yes/No for each method). Behaviors categorized as *unhealthy weight control behaviors* included fasted, ate very little food, used a food substitute (powder or a special drink), skipped meals, and smoked cigarettes. Behaviors categorized as *extreme weight control behaviors* included took diet pills, made myself vomit, used laxatives, and used diuretics. Responses were used to create two dichotomous indicators of having done any one or more of the unhealthy weight control

behaviors (test–retest agreement = 85%) and any one or more of the extreme weight control behaviors (test–retest agreement = 96%).⁹

To assess *binge eating*, adolescents responded to two questions³¹: “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)?” (Yes/No). If yes, they were asked: “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?” (Yes/No) (test–retest agreement = 90% [first question] and 75% [second question]). Participants needed to respond affirmatively to both questions to be coded as binge eating.

Predictor Variable: Family Meal Frequency

To assess *family meal frequency*, adolescents were asked, “During the past week, how many times did all, or most, of your family living in your household eat a meal together?”³² Response options included: never, 1–2 times, 3–4 times, 5–6 times, 7 times, and more than 7 times (Test–retest $r = .63$). For the current analysis, family meal frequency was treated as a continuous variable.

Moderating Variables

Adolescent Reported Variables—To assess *family functioning*, adolescents were asked to indicate agreement with the following statements: “Family members are accepted for who they are”; “Making decisions is a problem for the family”; “We don’t get along well together”; “We can express feelings to each other”; and “Planning family activities is difficult because we misunderstand each other”.^{33,34} Response options included strongly disagree, somewhat disagree, somewhat agree, and strongly agree. Responses were assigned values from 1 to 4, with reverse coding used for statements worded in the negative form, before values were added. Higher scores represent higher family functioning (Cronbach’s $\alpha = 0.70$).

Weight talk in the home was assessed by asking adolescents to indicate agreement with two statements about each of their parents: “My *mother/father* talks about her/his weight” and “My *mother/father* makes comments about other people’s weight.” Response options ranged on a 4-point scale from not at all to very much. Responses to these four questions were averaged to create a weight talk in the home variable (Cronbach’s $\alpha = 0.75$).

Family weight-related teasing was assessed by asking adolescents the question: “How often do family members make comments to you about your weight or your eating that make you feel bad?” Response options included: never, less than once a year, a few times a year, a few times a month, and a few times a week (test–retest $r = .67$).

Adolescent *enjoyment of family meals* was assessed with one item, “I enjoy eating meals with my family”. Response options ranged on a 4-point scale from strongly disagree to strongly agree (test–retest $r = .68$).

Parent Reported Variables—*Parent-led conversations about weight* were assessed using four items modified from the Parental Energy Index.²⁵ Mothers and fathers were

asked, “How often in the past year. . .”: (1) Have you had a conversation with your child about his/her weight or size?; (2) Have you mentioned to your child that he/she weighs too much?; (3) Have you mentioned to your child that he/she should eat differently to lose weight or keep from gaining weight?; and (4) Have you mentioned to your child that he/she should exercise to lose weight or keep from gaining weight? Participants responded to each item using a 5-point scale ranging from 1 (never or rarely) to 5 (almost every day) (test–retest $r = .73$, Cronbach’s $\alpha = 0.89$).

Food restriction was measured using six items (of eight) from the Child Feeding Questionnaire (CFQ) Restriction Subscale, which was designed to measure a parent’s attempt to control a child’s eating by restricting access to palatable foods.³⁵ *Pressure-to-eat* was assessed using the full CFQ Pressure-to-Eat Subscale, which was designed to measure the degree to which the parent encourages their child to eat more food. Overall scores for each scale were created by averaging responses to items from that scale. [Scale Range: 1 (low control) to 4 (high control); Restriction: $r = .72$, $\alpha = 0.86$; Pressure-to-eat: $r = .73$, $\alpha = 0.70$].

Covariates—Several demographic and personal characteristics of adolescents were considered for statistical analysis. *Age*, *race/ethnicity*, and *socioeconomic status (SES)* were based on adolescent self-report. *SES* was based primarily on parental education level (as reported by adolescent), defined as the higher level of educational attainment of either parent (test–retest $r = .90$). An algorithm was developed that also took into account family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parent employment status.^{36,37} *Body mass index (BMI)* was calculated using anthropometric data assessed by trained staff following standardized procedures.³⁸

Statistical Analysis—To examine associations between family meal frequency and disordered eating behaviors (dieting, unhealthy and extreme weight control behaviors, and binge eating), separate logistic regressions for each disordered eating behavior outcome were estimated with family meal frequency as the primary predictor controlling for adolescent age, race, SES, and BMI. The odds ratio (OR) and 95% confidence interval (CI) for family meal frequency represent the multiplicative change in odds (i.e., ORs less than 1 indicate protective effects) of exhibiting the disordered eating behavior for every one meal increase in family meals per week.

To determine whether there were differential effects of family meals on disordered eating behavior depending on the quality of familial interactions and mealtime atmosphere, a series of interaction models were performed. In total, we considered eight potential effect modifiers, including family functioning; parent-led conversation about weight; parent dieting behaviors; family weight-related teasing; weight and body talk in the home; food restriction; pressure-to-eat; and adolescent enjoyment of family meals. (see Fig. 1 for visual depiction of the research question and list of eight effect modifiers examined). For each of these eight moderators, a separate logistic regression model was fit with family meal frequency, the moderator, and the cross-product between the two controlling for adolescent age, race, SES, and BMI. BMI was first explored as a potential effect measure modifier; however, it was not found to modify any of the relationships, therefore BMI was only

included as a covariate. ORs and CIs are presented by using Paneled Forest Plots for each of the models run. For each model, we present the OR of the family meal frequency at the minimum and the maximum value of the moderator. For example, low pressure-to-eat corresponds to a value of 1 and high pressure-to-eat corresponds to a value of 4. Note, each of the moderators was measured on a continuous scale and was included in the regression as a continuous predictor, but for illustration of the interaction effect, ORs are presented at fixed high (maximum) vs. low (minimum) values of the moderator (see Appendix 1). CIs for the ORs appropriately account for the value at which the moderator is fixed. Reported *p* values were not adjusted for multiple testing. Appendix 1 includes information on the frequency of participants reporting the minimum and maximum levels of each potential effect measure modifier explored.

For the first research question (associations between family meal frequency and adolescent disordered eating behaviors), the analytic sample included all 2,793 adolescents who responded to the questions on the EAT 2010 survey. For the second research question (exploration of potential moderators in the relationship between family meal frequency and adolescent disordered eating behaviors), the analytic sample included either all 2,793 adolescents, if the moderating variable of interest was an item reported by the adolescent, or included only the 2,382 adolescents with available parent data if the moderating variable of interest was reported by the parents. Adolescents who had parents participate (*n* = 2,382) did not differ by weight status or age from those who did not have parents participate (*n* = 411); however, adolescents who had parents participate were more likely to be white and of mid-high to high SES, as compared with those who did not. All analyses were stratified by gender of the adolescent and performed in SAS 9.2 (SAS, Chicago, IL).

Results

Prevalence of Disordered Eating Behaviors Among Adolescents

Among boys, 31% (*n* = 406) reported dieting, 38% (*n* = 495) reported engaging in unhealthy weight control behaviors, 4% (*n* = 51) reported engaging in extreme weight control behaviors, and 6% (*n* = 81) reported engaging in binge eating with loss of control. Among girls, 46% (*n* = 680) reported dieting, 50% (*n* = 743) reported engaging in unhealthy weight control behaviors, 7% (*n* = 100) reported engaging in extreme weight control behaviors, and 10% (*n* = 141) reported engaging in binge eating with loss of control.

Family Meals and Disordered Eating Behaviors

Greater frequency of family meals was associated with significantly lower levels of dieting (OR = 0.94, CI = 0.90–0.98), unhealthy weight control behaviors (OR = 0.93, CI = 0.89–0.97), and extreme weight control behaviors in adolescent girls (OR = 0.88, CI = 0.80–0.95), but only with unhealthy weight control behaviors in adolescent boys (OR = 0.94, CI = 0.90–0.98) (Table 2). Statistically significant associations were not found between family meals and binge eating.

Effect Modification by Family Environment Variables

Of the 64 interactions examined (8 family level effect modifiers \times 4 outcome variables for boys and girls), only seven were found to be statistically significant at $p < .05$. This finding suggests that the protective effects of adolescents engaging in family meals against use of disordered eating behaviors were generally robust to the bulk of familial interaction and mealtime atmosphere variables examined in the current study. ORs and 95% CIs for each of the eight potential effect modifiers explored are displayed in Figures 2a and 2b at the low (minimum) and high (maximum) values of each modifier. ORs greater than 1 indicate an increased risk for adolescent engagement in the disordered eating behavior of interest, whereas ORs less than 1 indicate that the effect modifier was protective against the use of the disordered eating behavior of interest. Statistically significant effect modifiers ($p < .05$) are noted in the figure with an asterisk (*). Food restriction, parent-led conversations about weight, and pressure-to-eat were reported by parents, and thus analyses were limited to adolescents with parent data ($n = 2,382$); all other analyses were conducted with the full adolescent sample ($n = 2,793$).

Among boys (Fig. 2a), there was evidence of effect modification by three variables of 32 models examined: parental pressure-to-eat, atmosphere at family meals, and parental dieting. Parental use of pressure-to-eat feeding practices modified the association between family meals and use of unhealthy weight control behaviors ($p = .05$). The odds of engaging in unhealthy weight control behaviors decreased with greater family meal frequency among boys whose parents reported a low level of pressure-to-eat feeding practices; specifically, the odds of engaging in unhealthy weight control behaviors decreased by 0.83 with each additional meal eaten together with family in the past week ($p < .01$). In contrast, family meals offered no protection against unhealthy weight control behaviors among boys whose parents report using a high level of pressure-to-eat feeding practices (OR: 1.00, CI = 0.91–1.10). In addition, extreme weight control behaviors decreased with greater frequency of family meals among boys who reported enjoying their family meal experience; the odds of using extreme weight control behaviors decreased by 0.82 with each additional family meal eaten together in the past week (CI: 0.67–0.99). On the other hand, when boys reported a low level of enjoyment of family meals, boys who have frequent family meals are more likely to report engaging in extreme weight control behaviors (OR = 1.28, CI = 1.01–1.62). Finally, family meals were found to offer greater protection against the use of extreme weight control behaviors among boys whose parents engaged in frequent dieting ($p < .01$).

Among girls (Fig. 2b), evidence of statistically significant effect modification was found within four models (of 3 models examined). Family weight-related teasing modified associations between family meals and both dieting ($p = .01$) and unhealthy weight control behaviors ($p < .01$). For example, among girls, the odds of dieting decreased with greater family meal frequency in homes with low levels of family weight-related teasing (OR = 0.90, CI = 0.85–0.96). In contrast, the odds of dieting increased with greater frequency of family meals among girls who reported high levels of family weight-related teasing (OR = 1.09, CI = 0.97–1.24). In other words, family meals were protective against dieting for girls whose families engaged in no or low level weight-related teasing, but when weight teasing was present, exposure to family meals became a risk factor for engaging in dieting. There

was also evidence of significant effect modification by overall family functioning among girls for the association between family meals and unhealthy weight control behaviors ($p < .01$); for girls whose families had poor overall functioning, frequent family meals were associated with greater odds of engaging in unhealthy weight control behaviors. Finally, frequent family meals were found to be a risk factor for engaging in dieting among girls exposed to high levels of weight talk in the home ($p = .05$).

Discussion

The current study explored the association between family meal frequency and use of disordered eating behaviors among adolescents and sought to understand how variables in the family environment, including family functioning, parent-led conversations about weight, weight and body talk in the home, family weight-related teasing, parent feeding practices, and atmosphere at family meals, might moderate this association. Overall, greater frequency of family meals was associated with lower prevalence of dieting, unhealthy weight control behaviors, and extreme weight control behaviors in adolescent girls, but only with lower levels of unhealthy weight control behaviors in adolescent boys. The protective nature of family meals was found to be, in general, robust to differences in family level variables, suggesting that engagement in regular family meals should be recommended for the majority of families with adolescents.

Although some of the overall effect sizes were small, the findings from our first research question are in agreement with those from previous cross-sectional⁷ and longitudinal^{13,14} studies that also found a significant inverse association between family meal frequency and disordered eating among adolescents, particularly adolescent girls. The authors have previously suggested several possible mechanisms by which family meals may decrease the risk for endorsement of disordered eating behaviors, including parental modeling of healthy eating patterns, increased opportunities for connecting with teens via conversations, and regular monitoring of a child's eating behaviors and emotional health, allowing for early identification of problems.^{15,17,39}

Only a limited number of familial interaction and mealtime atmosphere variables were found to significantly moderate the association between frequency of family meals and adolescent engagement in disordered eating behaviors. The general trend of null findings found in the current manuscript aligns with the work of Haines et al.¹⁴ who found that the protection offered by family meals remained, even when adolescents in their study perceived thinness to be of importance to their parents, weight-based teasing was normative in their home environment and maternal dieting behaviors were reported. Overall, results of this current study, in conjunction with the previous work by Haines et al., suggest that for the most part, family meals are protective against the endorsement of disordered eating behaviors among adolescents. Furthermore, given the large number of interactions examined within the current study, it is important to consider that even the few significant results found may be, in fact, spurious associations.

However, it is worthwhile to reflect on the potential importance of each of the significant effect modifiers, particularly with regard to how these findings might impact clinical

recommendations for families. For example, the associations between family meals and unhealthy and extreme weight control behaviors among boys were modified by both adolescent enjoyment of family meals and parental report of pressure-to-eat. These findings suggest that boys may be influenced by mealtime atmosphere; when young men enjoy eating meals with their family and when parental control at meals is low, exposure to frequent family meals protects against the use of disordered eating behaviors. However, in circumstances when young men perceive the atmosphere at meals to be less enjoyable or they are exposed to more controlling (high pressure-to-eat) parenting practices, the protective nature of family meals against disordered eating behaviors diminishes. Given that research has shown boys are more likely than girls to be exposed to pressure-to-eat,⁴⁰ the moderating effect of this variable among boys might provide some explanation for why the strength of the association between family meal frequency and disordered eating behaviors has often been weaker among boys.

Among girls, the association between family meals and disordered eating behaviors was found to be moderated by family level weight and body talk, weight-based teasing, and overall family functioning. This suggests that for girls, the broader family environment may play a role in the level of protection that family meals can offer. For example, it might be that for girls who have experienced poor family functioning or have been exposed to family weight teasing or high levels of weight talk, sharing a meal with the family does not offer the same safety or protection against the use of disordered eating, as compared with girls living in a family environment that is characterized by positive family functioning and free of weight-based conversations. Future research should aim to understand how often weight-based teasing or weight/body talk is occurring at family meals versus other times and how the timing of this negative weight-based talk might impact the association between family meal frequency and disordered eating behaviors.

Strengths and limitations should be considered in interpreting these study findings. The large, diverse, population-based sample used in the current study allows for generalizability of the study findings to nonclinical samples. Furthermore, inclusion of both boys and girls in the sample allowed for exploration of how adolescent gender might influence the impact of certain family-level effect modifiers. Finally, the large number of measures assessing the family and mealtime environment allowed for the exploration of how these variables might moderate associations between family meals and disordered eating in adolescents. However, the cross-sectional study design is a limitation of the current study as the temporal ordering of changes over time in family meal frequency and disordered eating behaviors remains unclear. For example, as previously supported by longitudinal research, it could be that eating regular meals with family members protects adolescents from engaging in disordered eating behaviors.^{7,13,17,41,42} On the other hand, it could be that adolescents who eat family meals less frequently may have more eating problems and, therefore, avoid engaging in meals with their family. Another study limitation is that our survey did not distinguish whether certain family-level variables (weight-based teasing, pressure-to-eat) occurred during family meal time. Finally, the use of primarily unvalidated survey instruments, for both adolescents and parents, should be taken into account when interpreting study results.

Conclusion

Findings from this study in a racially/ethnically and socioeconomically diverse, population-based sample suggest that adolescents, particularly girls, who eat more frequent family meals are less likely to engage in disordered eating behaviors. Future research efforts in this area should focus on building a better understanding of the underlying mechanisms by which eating meals with one's family protects against the use of disordered eating behaviors. In addition, researchers should continue to explore the possibility that the protective nature of family meals may be modified by familial interactions and mealtime atmosphere. Based on the results of this study, in conjunction with findings from other previously conducted research, dietetic practitioners, physicians, and other healthcare providers working with families of adolescents should continue to engage parents in discussions about the importance of making frequent family meals a priority. Parents should be made aware that participating in regular family meals offers some protection for their teen against engaging in disordered eating behaviors. Finally, in addition to asking parents of teens about the frequency of family meals during well-child visits, healthcare providers should consider providing anticipatory guidance for parents on how to create familial interactions and a mealtime atmosphere conducive to the development of healthy weight-related behaviors in adolescents.

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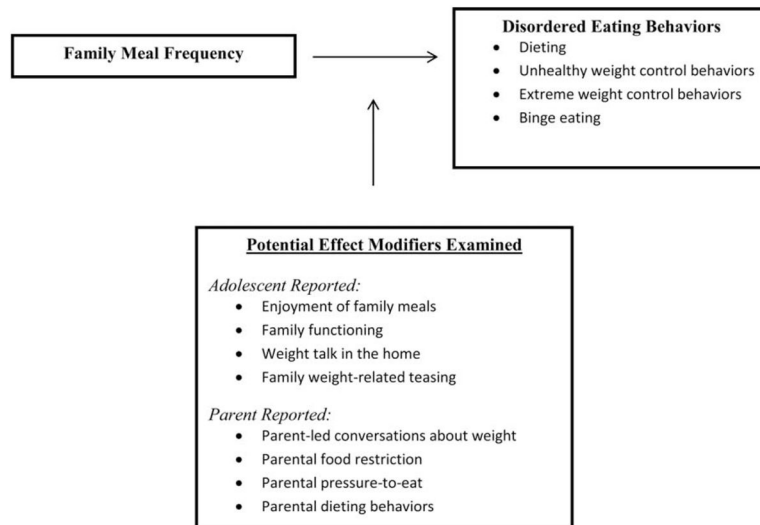


FIGURE 1. Theoretical model depicting the potential effect modifiers explored in the relationship between family meal frequency and disordered eating behaviors.

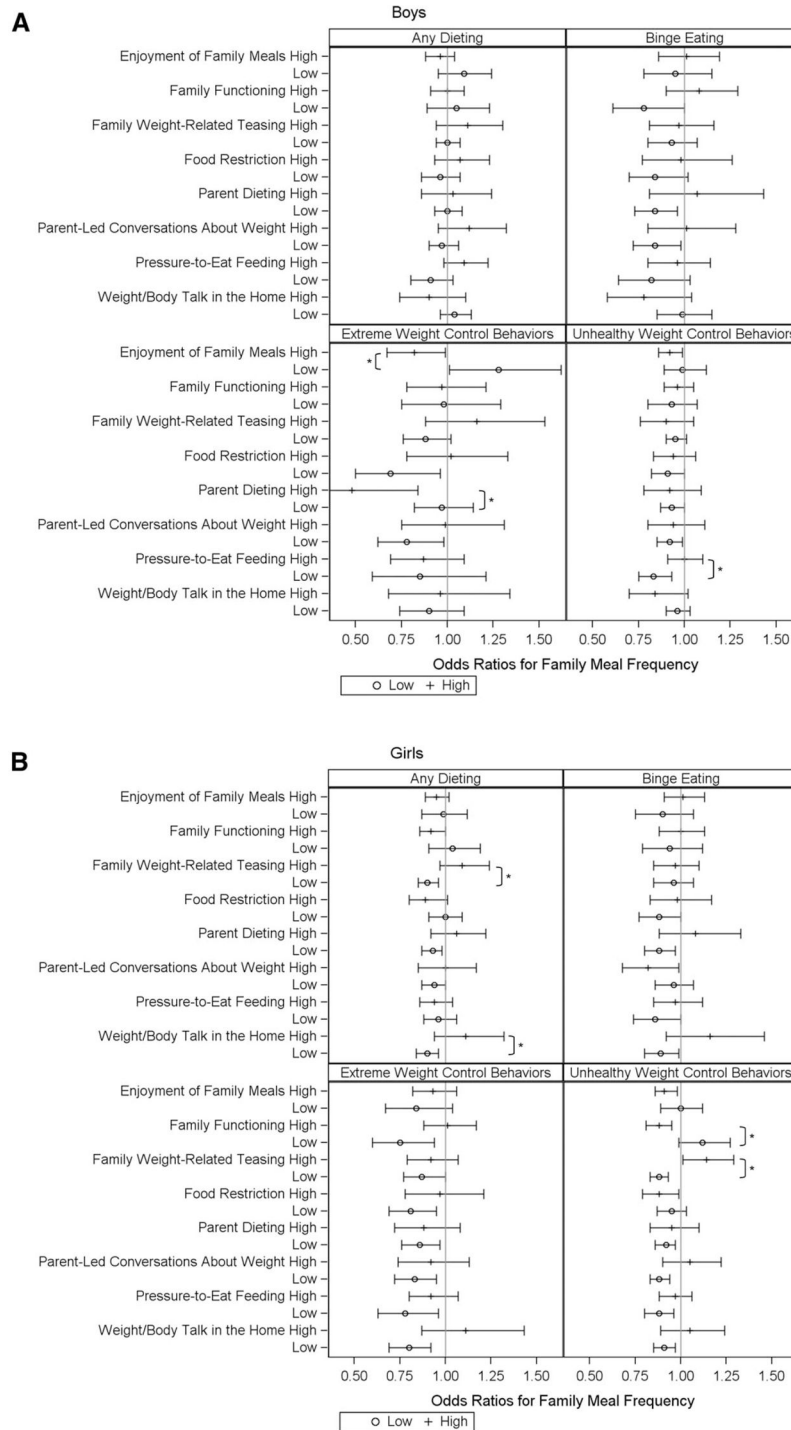


FIGURE 2. Effect modifiers (high versus low) of the relationship between family meal frequency and adolescent disordered eating behaviors, odds ratios and 95% confidence intervals. Notes: Odds Ratios and 95% confidence intervals for each of the 8 potential moderators of family meal frequency are displayed at the low (minimum) and high (maximum) values of each moderator. ORs greater than 1 indicate an increased risk for adolescent engagement in

disordered eating behaviors. Statistically significant effect modifiers ($p < 0.05$) are noted with an asterisk (*). Food restriction, parent-led conversations about weight, and pressure-to-eat were reported by parents, and thus analyses were limited to adolescents with parent data ($n=2382$), all other analyses were conducted with the full adolescent sample ($n=2,793$).

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TABLE 1

Characteristics of the EAT 2010 and Project F-EAT samples

Total (N)	Adolescents (EAT 2010)		Parent/Caregiver (Project F-EAT)	
	2793		2382	
Age (Mean, SD)	14.45	1.98	41.45	7.94
Gender (N, %)				
Male	1307	46.8	208	8.74
Female	1486	53.3	2173	91.3
Race (N, %)				
White	525	18.8	687	28.8
African American	808	28.9	662	27.8
Hispanic	472	16.9	394	16.5
Asian American	555	19.9	464	19.5
Native American	102	3.7	9	0.38
Mixed race/other/Missing	331	11.9	166	6.97
Socioeconomic status ^a (N, %)				
Low	1072	38.9	536	22.8
Mid-low	595	22.1	517	21.9
Middle	471	17.5	668	28.4
Mid-high	347	12.9	415	17.6
High	203	7.6	220	9.34
Weight status ^b (N,%)				
Normal	1079	38.6	697	31.1
Overweight	1101	39.5	785	35.1
Obese	613	21.9	735	32.8

^aSocioeconomic status (SES): Separate measures of SES were included in both the EAT 2010 and the Project F-EAT surveys. Details on how SES was assessed within each survey can be found in the measures section. Furthermore, details on how SES was included in each of the models presented can be found in the Statistical Analysis section.

^bNormal weight = 5th percentile to less than the 85th percentile; Overweight= 85th to less than the 95th percentile; Obese = equal to or greater than 95th percentile.

TABLE 2

Odds ratios of adolescents engaging in disordered eating behaviors associated with a one meal increase in family meals per week^a

Outcome	Boys (<i>n</i> = 1307)		Girls (<i>n</i> = 1,486)	
	OR	95% CI	OR	95% CI
Any dieting	1.00	(0.95–1.06)	0.94	(0.90–0.98)
Unhealthy weight control behaviors	0.94	(0.89–0.98)	0.93	(0.89–0.97)
Extreme weight control behaviors	0.94	(0.84–1.06)	0.88	(0.80–0.95)
Binge eating	0.92	(0.83–1.01)	0.94	(0.87–1.01)

OR – Odds ratio, CI – Confidence interval. Bold indicates OR significant at $p < .05$.

^aModels adjusted for adolescent age, race, socioeconomic status, and BMI.

Appendix 1

Frequency of participants reporting the minimum and maximum levels of potential effect measure modifiers

	Frequency at Minimum Level “Low” N (%)	Frequency at Maximum Level “High” N (%)
Enjoyment of family meals [Range = 1–4]	214 (8.0)	1002 (36.0)
Family functioning [Range = 1–4]	36 (1.0)	483 (17.0)
Weight talk in the home [Range = 1–4]	813 (30.0)	19 (1.0)
Family weight-related teasing [Range = 1–5]	1608 (59.0)	147 (5.0)
Parent-led conversations about weight [Range = 1–5]	708 (30.0)	50 (2.0)
Parental food restriction [Range = 1–4]	372 (16.0)	69 (3.0)
Parental pressure-to-eat [Range = 1–4]	259 (11.0)	151 (6.0)
Parental dieting behaviors [Range = 1–5]	1091 (46.0)	176 (7.0)

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