

Food-Related Parenting Practices and Adolescent Weight Status: A Population-Based Study

AUTHORS: Katie A. Loth, RD, MPH,^a Richard F. MacLehose, PhD,^a Jayne A. Fulkerson, PhD,^b Scott Crow, MD,^c and Dianne Neumark-Sztainer, RD, MPH, PhD^a

^aDivision of Epidemiology and Community Health, School of Public Health, ^bSchool of Nursing, and ^cDepartment of Psychiatry, University of Minnesota, Minneapolis, Minnesota

KEY WORDS

parenting, feeding, adolescent obesity, weight status

ABBREVIATIONS

EAT—Eating and Activity in Teens

F-EAT—Families and Eating and Activity Among Teens

SES—socioeconomic status

Ms Loth conceptualized the article, conducted the data analysis, interpreted the findings, and wrote the initial draft and all revised drafts of the manuscript; Dr MacLehose contributed to conceptualization of the study design, interpreted findings, provided substantial input on manuscript drafts, and approved the final version for submission; Dr Fulkerson contributed to conceptualization of the study design, interpreted findings, provided substantial input on manuscript drafts, and approved the final version for submission; Dr Crow contributed to conceptualization of the study design, provided substantial input on manuscript drafts, and approved the final version for submission; and Dr Neumark-Sztainer is the principal investigator on the grant/study from which this article was written and she assisted in conceptualizing the article, contributed to the design of the study, provided substantial input on manuscript drafts, and approved the final version of the manuscript.

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 nor the National Institutes of Health.

www.pediatrics.org/cgi/doi/10.1542/peds.2012-3073

doi:10.1542/peds.2012-3073

Accepted for publication Jan 23, 2013

Address correspondence to Katie A. Loth, RD, MPH, Division of Epidemiology and Community Health, University of Minnesota, 1300 S Second St, Suite 300, Minneapolis, MN 55455. E-mail: fall0075@umn.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2013 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: Dr Crow has previously received grant funding from Alkermes and Shire; this grant funding is unrelated to his involvement in the current research; the other authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: Supported by grants R01HL084064 and R01HL093247-02 (principal investigator: D. Neumark-Sztainer) from the National Heart, Lung, and Blood Institute. Funded by the National Institutes of Health (NIH).



WHAT'S KNOWN ON THIS SUBJECT: Despite numerous studies, evidence of the association between food-related parenting practices and child weight remains equivocal. Examination of this association within a sample of diverse adolescents is needed to inform anticipatory guidance provided by physicians working with parents of adolescents.



WHAT THIS STUDY ADDS: The current study explores associations between food-related parenting practices and weight status in a population-based sample of parent-adolescent pairs. This diverse sample allows for an in-depth examination of the role of gender, race/ethnicity, socioeconomic status, and grade level in this association.

abstract



OBJECTIVE: To examine food-related parenting practices (pressure-to-eat and food restriction) among mothers and fathers of adolescents and associations with adolescent weight status within a large population-based sample of racially/ethnically and socioeconomically diverse parent-adolescent pairs.

METHODS: Adolescents ($N = 2231$; 14.4 years old [SD = 2.0]) and their parents ($N = 3431$) participated in 2 coordinated population-based studies designed to examine factors associated with weight status and weight-related behaviors in adolescents. Adolescents completed anthropometric measurements and surveys at school. Parents (or other caregivers) completed questionnaires via mail or phone.

RESULTS: Findings suggest that the use of controlling food-related parenting practices, including pressure-to-eat and restriction, is common among parents of adolescents. Mean restriction levels were significantly higher among parents of overweight and obese adolescents compared with nonoverweight adolescents. However, levels of pressure-to-eat were significantly higher among nonoverweight adolescents. Results indicate that fathers are more likely than mothers to engage in pressure-to-eat behaviors and boys are more likely than girls to be on the receiving end of parental pressure-to-eat. Parental report of restriction did not differ significantly by parent or adolescent gender. No significant interactions by race/ethnicity or socioeconomic status were seen in the relationship between restriction or pressure-to-eat and adolescent weight status.

CONCLUSIONS: Given that there is accumulating evidence for the detrimental effects of controlling feeding practices on children's ability to self-regulate energy intake, these findings suggest that parents should be educated and empowered through anticipatory guidance to encourage moderation rather than overconsumption and emphasize healthful food choices rather than restrictive eating patterns. *Pediatrics* 2013;131:e1443–e1450

The identification of modifiable determinants of adolescent obesity has become a public health priority. Food-related parenting practices, including encouraging children to eat and restricting intake of palatable foods, have been identified as potentially significant determinants of weight status in children.¹ Research has shown that parents often adopt controlling feeding practices (eg, food restriction and pressure-to-eat) in response to concern about their child's weight.¹⁻³ Unfortunately, several studies have suggested that use of controlling food-related parenting practices is counterproductive, causing a disruption in children's innate self-regulation mechanisms and leading to eating in the absence of hunger and weight gain.^{1,2,4-6}

Initial cross-sectional studies conducted in samples of white, high-income, mother-daughter dyads revealed that controlling food-related parenting practices were significantly and positively associated with child weight status.^{2,7-10} Two separate longitudinal studies conducted within comparable samples revealed similar associations.^{11,12} However, results from more recent longitudinal studies challenge the simplicity of this association revealing inconsistent and sometimes opposite findings. A 2-cohort study reported that higher parental restriction at baseline was associated with lower child BMI z score at follow-up within the younger cohort (5 to 6 year olds); no association was found within the cohort of preadolescents (10 to 12 year olds).¹³ This null finding is consistent with the only other study conducted within a sample of preadolescents.¹⁴ A study conducted within a younger population (1 to 2 year olds) found that high levels of control at baseline were protective against unhealthy weight gain at follow-up.¹⁵

Thus, although the use of less-controlling food-related parenting practices is increasingly supported as a method to promote a healthy weight for children,¹⁶

evidence of the association between food-related parenting practices and child weight remains equivocal.^{11-15,17,18} In addition, limitations in study population curb the scope of our understanding of this association. Most studies investigating this relationship have been conducted within ethnically or socioeconomically homogenous samples of young children and have limited the report of food-related parenting practices to mothers only.¹ Whereas these studies have provided the basis for our understanding of this association, findings across ethnicity and socioeconomic status (SES) have been inconsistent.¹⁸⁻²¹ Research has also suggested that the positive association between food-related parenting practices and child weight seen in initial studies with younger children may not generalize to adolescents.^{13,14,22} Finally, studies of food-related parenting practices that have included separate assessments of these parenting behaviors by mothers and fathers are limited in number and results have been inconclusive.^{17,23-26} Additional research is needed to clarify the role of parent gender in this association, and findings will allow for a clearer picture of the home food environment.

To address these research gaps, the current study examined relationships between food-related parenting practices and adolescent weight status within a large and diverse population-based sample of parent-adolescent pairs. Cross-sectional associations were examined separately for fathers and mothers as well as boys and girls, and interactions by race/ethnicity and household income were examined. On the basis of previous studies, we predicted that increased parental restriction of child eating and reduced parental pressure-to-eat would be associated with higher adolescent weight status.^{1,12,14,27} Results will add to the growing body of literature examining

this important association and may be used to inform the anticipatory guidance provided by health care providers who work with parents of adolescents.

METHODS

Study Design and Population

Data for this analysis were drawn from 2 coordinated, population-based studies. Eating and Activity in Teens (EAT) 2010 was a population-based study in 2793 adolescents from 20 urban public schools in Minnesota designed to examine dietary intake, weight status, and associated factors. Surveys and anthropometric measures were completed by adolescents during 2009-2010. Project Families and Eating and Activity Among Teens (F-EAT) was designed to examine factors within the family environment of potential relevance to adolescent weight-related behaviors. Survey data were collected via mail or phone from up to 2 parents ($n = 3709$) of the adolescents in EAT 2010; all parents in Project EAT 2010 were invited to participate in Project F-EAT, and a response rate of 77.6% was achieved. Additional details on study design, data collection methods, and survey development can be found elsewhere.^{28,29} All study procedures were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee and participating school districts.

The current analytic sample includes EAT 2010 participants who had at least 1 parent with whom they lived at least 50% of the time who responded to the Project F-EAT questionnaire. The final sample consisted of 2231 adolescents and 3431 parents, with 67% of the adolescent sample having 2 parents included (Table 1).

Measures

Both the EAT 2010 student survey and Project F-EAT parent survey underwent extensive pilot testing and test-retest

TABLE 1 Characteristics of the EAT 2010 and Project F-EAT Samples

	Adolescents (EAT 2010)	Parents/Caregivers (Project F-EAT)
Total <i>N</i>	2231	3431
Age, mean \pm SD, y	14.4 \pm 2.0	42.3 \pm 8.6
Gender, <i>n</i> (%)		
Male	1045 (46.8)	1282 (37.4)
Female	1186 (53.2)	2149 (62.6)
Race, <i>n</i> (%)		
White	448 (20.1)	979 (29.8)
African American	611 (27.4)	823 (25.1)
Hispanic	392 (17.6)	595 (18.1)
Asian American	455 (20.4)	717 (21.8)
Mixed race/other	325 (15.6)	169 (5.2)
Family income level, <i>n</i> (%)		
Low	—	1041 (31.3)
Middle low	—	726 (21.6)
Middle	—	522 (15.6)
Middle high	—	413 (12.4)
High	—	641 (19.1)

—, not assessed by adolescents in EAT 2010, but only by parents in Project F-EAT.

reliability testing by both parents and adolescents and were reviewed by an interdisciplinary team of experts.

Two constructs of food-related parenting practices (eg, food restriction and pressure-to-eat) were assessed by asking parents 10 items drawn from the Child Feeding Questionnaire.²⁷ Food restriction was measured by using 6 items from the 8-item Restriction Subscale, a subscale designed to measure a parent's attempt to control a child's eating by restricting access to palatable foods. Two items from the subscale (ie, favorite food/sweets offered as reward) were dropped on the basis of recommendations from a validation study conducted within a diverse adolescent population.³⁰ Pressure-to-eat was assessed by using the Pressure-to-Eat Subscale, a 4-item subscale designed to measure the degree to which the parent encourages his or her child to eat more food. See Table 2 for full list of items. Response options were modified slightly from the original Child Feeding Questionnaire and included "disagree," "slightly disagree," "slightly agree," and "agree" (the "neutral" response option was dropped). For analyses of individual questions, parent agreement was defined as a response of slightly agree or agree.

Food restriction and pressure-to-eat scale scores were created by averaging responses across each construct (6-item and 4-item, respectively). Scores ranged from 1 (low) to 4 (high) (restriction: test-retest $r = 0.72$, $\alpha = .86$; pressure-to-eat: test-retest $r = 0.73$, $\alpha = .70$).

Race/ethnicity was assessed with the item, "Do you think of yourself as 1) white, 2) black or African-American, 3) Hispanic or Latino, 4) Asian-American, 5) Hawaiian or Pacific Islander, or 6) American Indian or Native American?" Household income was assessed on the parent survey with the question: "What was the total income of your household before taxes in the past year?" Parent BMI was calculated from self-reported height and weight. Adolescent BMI was calculated by using anthropometric data measured by trained research staff in a private space located at the school with the use of standardized equipment and procedures. Age- and gender-specific cutoffs for nonoverweight, overweight, and obesity were based on the 2000 Centers for Disease Control and Prevention Growth Charts.³¹ Due to concern that adolescents with a BMI in the underweight range (<15th percentile BMI; $n = 48$) might differ significantly

from other adolescents in our population, these individuals were not included in the current analysis.

Statistical Analysis

The prevalence of parents who agreed (ie, agreed or slightly agreed) with each of the 10 specific food-related parenting practices was calculated across adolescent weight status. χ^2 Tests were used to examine whether the proportion of parents endorsing agreement with each statement varied by adolescent weight status. Separate linear regression models were fit to estimate the association between parental report of restriction and pressure-to-eat scale scores and adolescent weight status. Adjusted means and difference in means were calculated for restriction and pressure-to-eat at each level of adolescent weight status. If the overall F-statistic was found to be significant, post hoc pairwise contrast tests were used to highlight sources of differences; superscripts identify groups that differ significantly. To assess potential effect measure modification of the relationship between food-related parenting practices and adolescent weight status by race/ethnicity or income, interaction terms were included in the models. Separate models were fit for each interaction term, but no significant interactions were found so subsequent models were adjusted for confounders including parental BMI, race/ethnicity, and household income. All models were estimated separately by parent gender (mothers/fathers) and adolescent gender (girls/boys). Reported *P* values were not adjusted for multiple testing. Analyses were conducted by using SAS, version 9.2 (SAS Institute, Cary, NC).³²

RESULTS

Our findings suggested that many parents report exercising some

TABLE 2 Parent Endorsement of Specific Food-Related Parenting Practices of Mothers and Fathers by Adolescent Weight Status

n	Pressure-to-Eat Behaviors, % of Parents Who Agree				Restriction Behaviors, % of Parents Who Agree						
	My Child Should Always Eat All of the Food on His/Her Plate	I Have to be Especially Careful to Make Sure My Child Eats Enough	If My Child Says, "I Am Not Hungry," I Try to Get Him/Her to Eat Anyway	If I Did Not Guide or Regulate My Child's Eating, My Child Would Eat Much Less Than He/She Should	I Have to be Sure That My Child Does Not Eat Too Many High-Fat Foods	I Have to be Sure That My Child Does Not Eat Too Many Sweets	I Have to be Sure That My Child Does Not Eat Too Many of His/Her Favorite Foods	If I Did Not Guide or Regulate My Child's Eating He/She Would Eat Too Much of His/Her Favorite Foods	If I Did Not Guide or Regulate My Child's Eating He/She Would Eat Too Many Junk Foods	If I Did Not Guide or Regulate My Child's Eating He/She Would Eat Too Many Junk Foods	I Intentionally Keep Some Foods Out of My Child's Reach
Mothers (n = 1915)											
Adolescent boys											
609	57.0	25.9	43.4	28.3	54.6*	63.2*	40.9*	44.3*	55.4*	25.3*	
166	50.0	31.0	39.4	23.3	63.8*	71.2*	50.0*	46.2*	60.6*	39.2*	
279	50.8	26.6	33.9	28.4	76.6*	80.7*	59.9*	64.2*	67.9*	49.0*	
Adolescent girls											
762	52.5*	27.3	47.2*	29.6*	54.3*	71.3*	41.9*	42.2*	51.4*	26.9*	
240	45.2*	27.3	41.9*	24.6*	63.5*	77.4*	55.1*	55.1*	59.5*	39.5*	
237	40.4*	19.8	30.8*	17.5*	79.4*	81.3*	67.7*	66.9*	65.2*	51.3*	
Fathers (n = 1210)											
Adolescent boys											
609	64.4	48.0	42.1	29.9	54.0*	65.5*	45.6	48.4	53.6*	32.5	
166	66.7	42.9	35.5	24.2	58.7*	71.4*	47.6	66.7	63.5*	28.6	
279	65.6	52.1	31.9	27.7	79.8*	78.2*	57.1	60.0	70.3*	38.1	
Adolescent girls											
762	57.9	48.5	40.3	33.0	59.1*	69.9	47.0*	34.2*	53.6	26.6*	
240	61.5	40.7	40.0	24.2	66.7*	74.4	58.2*	80.0*	60.0	40.0*	
237	57.5	40.7	32.2	23.8	73.3*	82.4	65.1*	80.0*	60.9	36.8*	

* Significant difference across weight-status categories, $P \leq .05$.

control over their adolescent with regard to the type or amount of food the adolescent consumes (Table 2). The percentage of parents reporting agreement with specific food-related parenting practices varied by adolescent weight status. For example, significantly more mothers of nonoverweight adolescent girls indicated agreement with the statement that "My child should always eat all food on his/her plate" compared with mothers of overweight and obese adolescent girls ($P < .05$). Parents of obese adolescents were significantly more likely than parents of overweight and normal-weight adolescents to report that they had to be sure their child did not eat too many high-fat foods or sweets, with between 73% and 81% of parents of obese adolescents responding affirmatively to these statements. In addition, significantly more fathers of overweight and obese adolescent boys indicated agreement with the statement that "If I did not guide or regulate my child's eating he/she would eat too many junk foods" compared with fathers of nonoverweight boys ($P < .05$).

Mean pressure-to-eat and restriction scale scores reported by parents was 2.21 and 2.51, respectively, indicating that, on average, parents within the sample reported using a low-to-moderate level of pressure-to-eat and a moderate level of food restriction with their adolescent child. However, for both boys and girls the mean scores of pressure-to-eat and food restriction differed significantly across adolescent weight status. Post hoc comparisons revealed that pressure-to-eat was highest for nonoverweight adolescents compared with overweight and obese adolescents (all $P < .01$) (Table 3). For example, mothers of nonoverweight girls reported a mean pressure-to-eat score of 2.21 compared with 2.01 for mothers of overweight girls and 1.86

TABLE 3 Adjusted Means and Differences of Adjusted Means of Parental Pressure-to-Eat and Restriction by Adolescent Weight Status

	Mothers' Report		Fathers' Report	
	Adjusted Means	Difference of Adjusted Means	Adjusted Means	Difference of Adjusted Means
Parental pressure-to-eat score: scale range, 1 (low) to 4 (high)				
Girls				
Nonoverweight	2.21 (2.13, 2.28) ^a	Referent	2.21 (2.11, 2.30) ^a	Referent
Overweight	2.01 (1.90, 2.13) ^b	−0.19 (−0.32, −0.07)	2.05 (1.89, 2.22) ^b	−0.15 (−0.33, 0.02)
Obese	1.86 (1.73, 1.98) ^b	−0.35 (−0.49, −0.21)	2.02 (1.87, 2.18) ^b	−0.18 (−0.35, −0.01)
<i>P</i>	<.01		<.01	
Boys				
Nonoverweight	2.33(2.24, 2.42) ^a	Referent	2.41 (2.29, 2.52) ^a	Referent
Overweight	2.26(2.11, 2.41) ^{a,b}	−0.07 (−0.23, 0.09)	2.25 (2.10, 2.41) ^b	−0.15 (−0.33, 0.03)
Obese	2.12 (2.00, 2.23) ^b	−0.22 (−0.35, −0.08)	2.18 (2.03, 2.32) ^b	−0.23 (−0.39, −0.06)
<i>P</i>	<.01		<.01	
Parental restriction score: scale range, 1(low) to 4 (high)				
Girls				
Nonoverweight	2.41 (2.31, 2.51) ^a	Referent	2.33 (2.22, 2.44) ^a	Referent
Overweight	2.55 (2.36, 2.73) ^a	0.14 (−0.07, 0.34)	2.53 (2.34, 2.72) ^{a,b}	0.20 (−0.01, 0.40)
Obese	2.81 (2.67, 2.96) ^b	0.40 (0.24, 0.56)	2.66 (2.48, 2.85) ^b	0.33 (0.12, 0.54)
<i>P</i>	.01		<.01	
Boys				
Nonoverweight	2.32 (2.23, 2.41) ^a	Referent	2.47 (2.34, 2.60) ^a	Referent
Overweight	2.58 (2.44, 2.72) ^b	0.26 (0.11, 0.42)	2.56 (2.34, 2.79) ^{a,b}	0.09 (−0.15, 0.34)
Obese	2.86 (2.69, 3.02) ^c	0.54 (0.36, 0.72)	2.78 (2.63, 2.94) ^b	0.31 (0.12, 0.51)
<i>P</i>	<.01		<.01	

Parent BMI, race/ethnicity, and household income are included as covariates. Adjusted means with different alphabetical superscripts are statistically different at an α level of $P < .05$.

for mothers of obese girls. Mean food restriction was found to be highest among obese adolescents (all $P < .01$) (Table 3). For example, mothers of nonoverweight girls reported a mean restriction score of 2.41 compared with 2.55 and 2.81 for mothers of overweight and obese girls, respectively.

Fathers of both girls and boys reported significantly higher levels of pressure-to-eat compared with mothers (girls: $P = .02$; boys: $P < .01$). For example, fathers reported mean scores of 2.41, 2.25, and 2.18 for normal, overweight, and obese boys, whereas mothers reported mean scores of 2.33, 2.26, and 2.12 for the same boys in each of the respective weight categories. Pressure-to-eat scores reported by both mothers ($P = .03$) and fathers ($P = .02$) were significantly higher for boys than for girls. Food restriction did not differ significantly by parent or adolescent gender. Finally, no significant interactions by race/ethnicity or household income were found in the

relationship between pressure-to-eat or restriction and adolescent weight status.

DISCUSSION

The current study addressed important research gaps by examining the relationship between food-related parenting practices and weight status within a racially/ethnically and socioeconomically diverse sample of parent-adolescent pairs. In addition, this study included an examination of the role of parent and adolescent gender in this relationship. Results indicate that mean food restriction was significantly higher among parents of overweight and obese adolescents compared with nonoverweight adolescents, whereas mean pressure-to-eat was significantly higher among nonoverweight adolescents. In addition, results suggested that fathers were more likely than mothers to engage in pressure-to-eat with their adolescents and that boys were more likely than girls to be on the

receiving end of pressure-to-eat behaviors. Food restriction did not differ significantly by parent or adolescent gender. Finally, the relationship between food-related parenting practices and adolescent weight status did not differ by race/ethnicity or SES.

Although the modifications made to the response options in the current study prohibit direct comparison of mean pressure-to-eat (2.21) and food restriction (2.51) scale scores, it is of note that the scores found within the current study align closely with the range of reported means (pressure-to-eat: 2.10–2.20; restriction: 2.50–3.00) found elsewhere in the literature. The overall body of literature suggests that, on average, parents use pressure-to-eat at low-to-moderate levels and food restriction at moderate-to-high levels.^{6,11,13,14,22,25} To our knowledge, the current study is the first study that reports mean scale scores by child weight status, making it impossible to know if the differences in

reported mean scores by adolescent weight status are comparable to other study populations.

Consistent with previous research,^{1,11,12,20} the current study revealed that mean level of parental restriction was highest among parents of overweight and obese adolescents; the temporal direction of this relationship, however, is not entirely clear. The relationship between parental restriction and child weight status is likely to be bidirectional; that is, whereas high levels of food restriction have been shown to lead to an increase in child weight status, parents of overweight and obese adolescents are more likely to adopt restrictive parenting practices in an effort to help curb their child's food intake.^{1,8,10,33,34} Results from a small number of studies indicate that parental restriction often precedes excess weight in young children, suggesting that the bidirectional path begins with parental use of controlling feeding practices; this exposure then leads to weight gain over time for the child and creates a feedback cycle in which both food-related parenting practices and the child's excess weight gain persist across time.^{5,7,8,35}

Although more research is necessary to establish with certainty that it is parental restriction that initiates what is likely a complex lifelong interaction between food-related parenting practices and child weight status, it is recommended that that parents of adolescents engage in behaviors known to protect against weight gain, including eating regular family meals, making nutritious food items readily available within the home, modeling healthy food choices, and encouraging their adolescent's autonomy in self-regulation of food intake.^{16,36} Along these lines, a recent study by Ogden et al³⁷ proposed that parental use of covert control (limiting availability of palatable snacks within the home) as

opposed to overt control (placing restrictions or invoking rules on the intake of available food) could aid in making healthy food choices the default for a child while still allowing the child independence regarding choices about food and eating. Health care provider-directed anticipatory guidance for parents of adolescents should include discussion of the important role parents play in creating a healthful home food environment for their teen.

Although pressure-to-eat is less often discussed within the literature,^{1,2,6,13} several notable findings related to this construct emerged within the current study that warrant additional discussion. Findings suggest that fathers are significantly more likely than mothers to engage in pressure-to-eat behaviors with their adolescents. Whereas the magnitude of the mean difference in pressure-to-eat by parent gender found in the current study was small, the consistency of this finding with previous research,²³ which also revealed father's use of pressure-to-eat to be significantly higher than mothers, indicates that future research should continue to explore parental gender differences in the use of food-related parenting practices. The current study also revealed that boys are more likely than girls to be on the receiving end of parental pressure-to-eat behaviors. Although the current study did not explore parental reasons for use of pressure-to-eat feeding practices, previous research is instructive and cites economic strain (eg, "Don't waste food"), desire to promote intake of healthy foods (eg, "Finish your veggies"), as well as parental belief that food consumption and ample weight status is a sign of future health and well-being (eg, "Eat plenty to grow big and strong") as reasons parents pressure their children to eat.^{3,5,35,38,39} The gender differences seen in pressure-to-eat reported within this

study might reflect gender-specific parental motivations; for example, given that a higher overall body weight is more socially acceptable, and often desirable, for boys than for girls,^{40,41} parents might be more motivated to help boys achieve this preferred stature through the use of pressure-to-eat techniques in comparison with girls for whom a slender build is generally preferred.^{40,41} Future research is needed to confirm these rather novel findings. In addition, given the overall prevalence of pressure-to-eat behaviors in the current study, future research aimed at understanding parental motivation for use of pressure-to-eat techniques is warranted.

Finally, it is of interest to note that no significant interactions by race/ethnicity or household income were found in the relationship between pressure-to-eat or restriction and adolescent weight status. This finding suggests that although the extent to which parents adopt a controlling approach to child feeding is known to differ across families,^{14,42-44} specifically with regard to race/ethnicity or SES, the associations between food-related parenting practices and child weight status in the current population did not differ on the basis of the race/ethnicity or SES of the parent. The lack of significant effect modification by race/ethnicity is consistent with 2 previously conducted studies.^{20,45}

The study's strengths and limitations should be taken into account when interpreting our study findings. Study strengths include the use of a large racially/ethnically and socioeconomically diverse sample, the high response rate of parents, and the inclusion of data from fathers in addition to mothers. A widely used and well-validated tool was used to measure food-related parenting practices,²⁷ although this tool was adapted slightly

(2 items removed, response options modified) for this study. The current study also has several limitations. Foremost is the cross-sectional design, which limits our ability to understand the direction of the associations found here between food-related parenting practices and adolescent weight status. In addition, as with any research study, we cannot exclude residual confounding by imperfectly measured or unmeasured confounders. Finally, measurement limitations include the potential for differential self-report bias by sociodemographic characteristics (ie, 1 group

may overreport behaviors that they perceive to be desirable compared with another group.)

CONCLUSIONS

Our study findings suggest that the use of controlling food-related parenting practices are common among parents of adolescents and are associated with adolescent weight status: food restriction levels are highest among parents of overweight and obese adolescents, whereas pressure-to-eat behaviors were more frequently reported by parents of nonoverweight

adolescents. Unfortunately, there is accumulating evidence for the detrimental effects of controlling food-related parenting practices on children's ability to self-regulate energy intake. This information may be counterintuitive for some parents, making it necessary that physicians and other health care providers educate and empower parents through anticipatory guidance to promote healthy eating by making nutritious food items readily available within their home, modeling healthy food choices, and encouraging their adolescent's autonomy in self-regulation of food intake.

REFERENCES

- Faith MS, Scanlon KS, Birch LL, Francis LA, Sherry B. Parent-child feeding strategies and their relationships to child eating and weight status. *Obes Res*. 2004;12(11):1711–1722
- Birch LL, Fisher JO. Mothers' child-feeding practices influence daughters' eating and weight. *Am J Clin Nutr*. 2000;71(5):1054–1061
- Cutting TM, Fisher JO, Grimm-Thomas K, Birch LL. Like mother, like daughter: familial patterns of overweight are mediated by mothers' dietary disinhibition. *Am J Clin Nutr*. 1999;69(4):608–613
- Birch LL. Development of food preferences. *Ann Rev of Nutr*. 1999;19:41–62
- Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. *Pediatrics*. 1998;101(3 pt 2):539–549
- Birch LL, Fisher JO, Davison KK. Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. *Am J Clin Nutr*. 2003;78(2):215–220
- Fisher JO, Birch LL. Restricting access to palatable foods affects children's behavioral response, food selection, and intake. *Am J Clin Nutr*. 1999;69(6):1264–1272
- Fisher JO, Birch LL. Restricting access to foods and children's eating. *Appetite*. 1999;32(3):405–419
- Joyce JL, Zimmer-Gembeck MJ. Parent feeding restriction and child weight: the mediating role of child disinhibited eating and the moderating role of the parenting context. *Appetite*. 2009;52(3):726–734
- Costanzo PR, Woody EZ. Domain-specific parenting styles and their impact on the child's development of particular deviance: The example of obesity proneness. *J Soc Clin Psychol*. 1985;3(4):425–445
- Fisher JO, Birch LL. Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *Am J Clin Nutr*. 2002;76(1):226–231
- Faith MS, Berkowitz RI, Stallings VA, Kerns J, Storey M, Stunkard AJ. Parental feeding attitudes and styles and child body mass index: prospective analysis of a gene-environment interaction. *Pediatrics*. 2004;114(4):e429–e436. Available at: www.pediatrics.org/cgi/content/full/114/4/e429
- Campbell K, Andrianopoulos N, Hesketh K, et al. Parental use of restrictive feeding practices and child BMI z-score: a 3-year prospective cohort study. *Appetite*. 2010;55(1):84–88
- Spruijt-Metz D, Li C, Cohen E, Birch L, Goran M. Longitudinal influence of mother's child-feeding practices on adiposity in children. *J Pediatr*. 2006;148(3):314–320
- Farrow CV, Blissett J. Controlling feeding practices: cause or consequence of early child weight? *Pediatrics*. 2008;121(1):e164–e169. Available at: www.pediatrics.org/cgi/content/full/121/1/e164
- Krebs NF, Jacobson MS; American Academy of Pediatrics Committee on Nutrition. Prevention of pediatric overweight and obesity. *Pediatrics*. 2003;112(2):424–430
- Haycraft E, Blissett J. Predictors of paternal and maternal controlling feeding practices with 2-to 5-year-old children. *J Nutr Educ Behav*. 2012;44(5):390–397
- Powers SW, Chamberlin LA, van Schaick KB, Sherman SN, Whitaker RC. Maternal feeding strategies, child eating behaviors, and child BMI in low-income African-American preschoolers. *Obesity (Silver Spring)*. 2006;14(11):2026–2033
- Matheson DM, Robinson TN, Varady A, Killen JD. Do Mexican-American mothers' food-related parenting practices influence their children's weight and dietary intake? *J Am Diet Assoc*. 2006;106(11):1861–1865
- Robinson TN, Kiernan M, Matheson DM, Haydel KF. Is parental control over children's eating associated with childhood obesity? Results from a population-based sample of third graders. *Obes Res*. 2001;9(5):306–312
- Baughcum AE, Powers SW, Johnson SB, et al. Maternal feeding practices and beliefs and their relationships to overweight in early childhood. *J Dev Behav Pediatr*. 2001;22(6):391–408
- Spruijt-Metz D, Lindquist CH, Birch LL, Fisher JO, Goran MI. Relation between mothers' child-feeding practices and children's adiposity. *Am J Clin Nutr*. 2002;75(3):581–586
- Brann LS, Skinner JD. More controlling child-feeding practices are found among parents of boys with an average body mass index compared with parents of boys with a high body mass index. *J Am Diet Assoc*. 2005;105(9):1411–1416
- Johannsen DL, Johannsen NM, Specker BL. Influence of parents' eating behaviors and child feeding practices on children's weight

- status. *Obesity (Silver Spring)*. 2006;14(3):431–439
25. Blissett J, Meyer C, Haycraft E. Maternal and paternal controlling feeding practices with male and female children. *Appetite*. 2006;47(2):212–219
 26. Haycraft EL, Blissett JM. Maternal and paternal controlling feeding practices: reliability and relationships with BMI. *Obesity (Silver Spring)*. 2008;16(7):1552–1558
 27. Birch LL, Fisher JO, Grimm-Thomas K, Markey CN, Sawyer R, Johnson SL. Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite*. 2001;36(3):201–210
 28. Bruening M, MacLehose R, Loth K, Story M, Neumark-Sztainer D. Feeding a family in a recession: food insecurity among Minnesota parents. *Am J Public Health*. 2012;102(3): Available at: <http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2011.300390>. Accessed December 13, 2012
 29. Berge JM, MacLehose RF, Loth KA, et al. Family meals: associations with weight and eating behaviors among mothers and fathers. *Appetite*. 2012;58(3):1128–1135
 30. Kaur H, Li C, Nazir N, et al. Confirmatory factor analysis of the child-feeding questionnaire among parents of adolescents. *Appetite*. 2006;47(1):36–45
 31. Kuczmarski RJ, Ogden CL, Guo SS, et al. 2000 CDC growth charts for the United States: methods and development. *Vital Health Stat 11*. 2002;246:1
 32. SAS Institute. SAS User's Guide: Statistics. Cary, NC: SAS Institute; 1985
 33. Wardle J, Sanderson S, Guthrie CA, Rapoport L, Plomin R. Parental feeding style and the inter-generational transmission of obesity risk. *Obes Res*. 2002;10(6):453–462
 34. Wardle J, Carnell S. Parental feeding practices and children's weight. *Acta Paediatr Suppl*. 2007;96(454):5–11
 35. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: conception to adolescence. *J Law Med Ethics*. 2007;35(1):22–34
 36. Satter E. The feeding relationship: problems and interventions. *J Pediatr*. 1990;117(2 pt 2):S181–S189
 37. Ogden J, Reynolds R, Smith A. Expanding the concept of parental control: a role for overt and covert control in children's snacking behaviour? *Appetite*. 2006;47(1):100–106
 38. Sherry B, McDivitt J, Birch LL, et al. Attitudes, practices, and concerns about child feeding and child weight status among socioeconomically diverse white, Hispanic, and African-American mothers. *J Am Diet Assoc*. 2004;104(2):215–221
 39. May AL, Donohue M, Scanlon KS, et al. Child-feeding strategies are associated with maternal concern about children becoming overweight, but not children's weight status. *J Am Diet Assoc*. 2007;107(7):1167–1175
 40. Presnell K, Bearman SK, Stice E. Risk factors for body dissatisfaction in adolescent boys and girls: a prospective study. *Int J Eat Disord*. 2004;36(4):389–401
 41. Barker ET, Galambos NL. Body dissatisfaction of adolescent girls and boys: risk and resource factors. *J Early Adolesc*. 2003;23(2):141–165
 42. Iannotti RJ, O'Brien RW, Spillman DM. Parental and peer influences on food consumption of preschool African-American children. *Percept Mot Skills*. 1994;79(2):747–752
 43. Crouch P, O'Dea JA, Battisti R. Child feeding practices and perceptions of childhood overweight and childhood obesity risk among mothers of preschool children. *Nutrition & Dietetics*. 2007;64(3):151–158
 44. Cousins JH, Power TG, Olvera-Ezzell N. Mexican-American mothers' socialization strategies: effects of education, acculturation, and health locus of control. *J Exp Child Psychol*. 1993;55(2):258–276
 45. Spruij-Metz D, Lindquist CH, Birch LL, Fisher JO, Goran MI. Relation between mothers' child-feeding practices and children's adiposity. *Am J Clin Nutr*. 2002;75(3):581–586

**Food-Related Parenting Practices and Adolescent Weight Status: A
Population-Based Study**

Katie A. Loth, Richard F. MacLehose, Jayne A. Fulkerson, Scott Crow and Dianne
Neumark-Sztainer

Pediatrics 2013;131:e1443

DOI: 10.1542/peds.2012-3073 originally published online April 22, 2013;

**Updated Information &
Services**

including high resolution figures, can be found at:
<http://pediatrics.aappublications.org/content/131/5/e1443>

References

This article cites 41 articles, 11 of which you can access for free at:
<http://pediatrics.aappublications.org/content/131/5/e1443#BIBL>

Subspecialty Collections

This article, along with others on similar topics, appears in the
following collection(s):

Nutrition

http://www.aappublications.org/cgi/collection/nutrition_sub

Eating Disorders

http://www.aappublications.org/cgi/collection/eating_disorders_sub

Obesity

http://www.aappublications.org/cgi/collection/obesity_new_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or
in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Food-Related Parenting Practices and Adolescent Weight Status: A Population-Based Study

Katie A. Loth, Richard F. MacLehose, Jayne A. Fulkerson, Scott Crow and Dianne Neumark-Sztainer

Pediatrics 2013;131:e1443

DOI: 10.1542/peds.2012-3073 originally published online April 22, 2013;

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/131/5/e1443>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2013 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

