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Maternal Influences on Daughters' Restrained Eating Behavior

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Abstract

This study examined whether mothers' preoccupation with their own weight and eating was linked to daughters' restrained eating behavior. Participants included 173 non-Hispanic, White mother–daughter dyads, measured longitudinally when daughters were ages 5, 7, 9, and 11. Mothers who were preoccupied with their own weight and eating reported higher levels of restricting daughters' intake and encouraging daughters to lose weight over time. Mothers' encouragement of daughters' weight loss was linked to daughters' restrained eating behavior; this relationship was partially mediated by daughters' perception of maternal pressure to lose weight. These findings suggest that mothers' preoccupation with weight and eating, via attempts to influence daughters' weight and eating, may place daughters at risk for developing problematic eating behaviors.

Keywords

family environment; modeling; control; restrained eating; weight loss

There is extensive evidence that parenting practices influence child outcomes (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Maccoby, 2000). In the eating domain, children's eating behaviors may be learned through parents' modeling of eating behaviors (Cutting, Fisher, Grimm-Thomas, & Birch, 1999; Pike & Rodin, 1991), via parenting practices used to restrict children's eating behavior (Edmunds & Hill, 1999; Fisher & Birch, 1999), or through messages transmitted to children about their weight and eating (Baker, Whisman, & Brownell, 2000; Wertheim, Mee, & Paxton, 1999). Costanzo and Woody (1985) proposed that when parents are highly invested in a particular domain of their children's development, the level of control they exert over children's behavior in that domain is likely to be high, and this excessive control undermines the development of children's self-regulation. In an article describing obesity proneness in children, Costanzo and Woody showed that parents who reported higher levels of weight concerns and dieting had children who reported similar concerns. Mothers who are preoccupied with their own weight and eating also make more attempts to influence their children's weight and eating (Birch & Fisher, 2000; Francis, Hofer, & Birch, 2001; Tiggemann & Lowes, 2002).

Excessive parental control of children's eating may affect children's developing self-regulation of food intake (Birch, Fisher, & Davison, 2003; Fisher & Birch, 1999; Johnson & Birch, 1994) and restrained eating or dieting behavior (Carper, Fisher, & Birch, 2000; Edmunds & Hill, 1999). Restriction in child feeding includes attempts to restrict children's intake of foods, specifically foods high in fat, sugar, and salt (energy-dense foods; Birch & Fisher, 2000). We have previously shown that mothers who reported restricting their daughters' access to specific snack foods had daughters who experienced negative affect (shame and guilt) after eating the “forbidden” foods in an unrestricted laboratory setting (Fisher & Birch, 2000). Parental

pressure or encouragement to diet or lose weight is also associated with children's restrained eating behavior or dieting behavior (Benedikt, Wertheim, & Love, 1998; Wertheim et al., 1999), and the influence of encouragement or pressure may be stronger than parental modeling of problematic eating behaviors (Baker et al., 2000; Smolak, Levine, & Schermer, 1999). Thus, there is evidence that parental attempts to influence children's eating behavior and weight status may have adverse effects on children's developing eating behaviors.

Children's eating behaviors may also be influenced by children's perceptions of parental pressure to lose weight. Several reports have shown that children's restrained eating behavior and dieting practices are highly linked to perceptions of parental pressure and/or encouragement to diet or lose weight (Baker et al., 2000; Benedikt et al., 1998; Wertheim et al., 1999). Baker et al. (2000), in a study examining the intergenerational transmission of eating attitudes and behaviors, concluded that college students' perceptions of their parents' behavior appear to be more highly linked to students' eating concerns and related behaviors than were parental reports of their own behaviors.

The overall objective of this study was to determine (a) whether mothers who were more highly preoccupied with their own weight and eating made attempts to influence their daughters' weight and eating, (b) whether these attempts to influence daughters' weight and eating were linked to daughters' restrained eating behavior, and (c) whether relationships between mothers' attempts to influence daughters' weight and eating and daughters' restrained eating behavior were mediated by daughters' perceptions of maternal pressure to lose weight.

Method

Participants

Participants were 173 non-Hispanic, White mother–daughter dyads living in central Pennsylvania, recruited as part of a longitudinal study of the health and development of young girls. At study entry, participants included 197 girls who averaged 5.4 years of age ($SD = 0.4$) and their parents, of whom 192 families were reassessed 2 years later, when the girls averaged 7.3 years of age ($SD = 0.3$). A third assessment with 183 families was conducted 2 years later, when the girls averaged 9.3 years of age ($SD = 0.3$), followed by a fourth assessment with 177 families when the girls averaged 11.3 years of age ($SD = 0.3$). Attrition was the result of either relocation or failure to complete data. Eligibility criteria for girls' participation at the time of recruitment included living with both biological parents, the absence of severe food allergies or chronic medical problems affecting food intake, and the absence of dietary restrictions involving animal products. Families were recruited for participation in a study about the development of girls across the early school period using flyers and newspaper advertisements. In addition, families with age-eligible female children within a five-county radius received mailings and follow-up phone calls (Metromail Inc.); families were not recruited on the basis of weight status or concerns about weight. On average, mothers were in their mid-30s at the time of recruitment ($M = 35.4$ years, $SD = 4.8$). Sixty-three percent of mothers reported working for pay at study entry, and approximately equal numbers of families reported annual incomes in the following ranges: \$20,000–\$35,000, \$35,000–\$50,000, and above \$50,000. Mothers were well-educated, reporting a mean education of 15 years ($SD = 2$).

Of the 177 dyads from which we had data at age 11, 4 were excluded from analyses for the following reasons: Three families who relocated could not participate when daughters were age 9 but returned when daughters were age 11. One girl, because of her extremely high score on the Dieting subscale of the Children's Eating Attitudes Test (ChEAT; Maloney, McGuire, Daniels, & Specker, 1989) was a univariate outlier. This left 173 cases with complete data. Only data from mothers and daughters were used in this study. The Pennsylvania State

University Institutional Review Board approved all study procedures, and parents provided consent for their family's participation before the study began.

Measures

Most measures used in this study were obtained from mothers and daughters when daughters were ages 5, 7, 9, and 11. Daughters' dieting attitudes and perceptions of maternal pressure to lose weight and maternal encouragement of daughters' weight loss were only obtained when daughters were age 9 and age 11; these measures were being developed and were ready to be administered only at the 9-year time point. All other measures were collected at all time points, when daughters were ages 5, 7, 9, and 11. To assess the extent to which living in a chronic weight- and eating-focused family environment affects eating behavior, we averaged scores on each major variable across time. This not only reduced the number of variables used in analyses, it also allowed us to make speculations about the long-term effect of mothers' preoccupation with weight and eating on daughters' outcomes.

Maternal Measures

Mothers' preoccupation with their own weight and eating—Mothers' scores on the Weight Concerns Scale (Killen et al., 1994) and the Restraint and Disinhibition subscales from the Three-Factor Eating Questionnaire (Stunkard & Messick, 1985) were used to create a construct that measured mothers' preoccupation with their own weight and eating over time. The Weight Concerns Scale measures fear of weight gain, worry about weight and body shape, the importance of weight, diet history, and perceived fatness. The measure consists of five items, four of which use a 5-option Likert-type response scale. Item 3 was amended from “When was the last time you went on a diet?” to “Have you ever gone on a diet?” to tap the frequency of dieting in the past. For this item, a 3-option response scale was provided when daughters were ages 5 and 7. When daughters were ages 9 and 11, the response options were increased from 3 to 5. An average weight concerns score was calculated at each time point. Internal consistency coefficients for items on this scale were .82, .77, .83, and .78 when daughters were ages 5, 7, 9, and 11, respectively.

The Three-Factor Eating Questionnaire developed by Stunkard and Messick (1985) consists of 51 true–false items designed to tap (a) dietary restraint (21 items), (b) dietary disinhibition (16 items), and (c) susceptibility to hunger (14 items); only the Restraint and Disinhibition subscales were used in this study. Mothers respond to items regarding cognitive control of eating behavior (restraint; e.g., “I consciously hold back at meals in order not to gain weight”) and disinhibition of control of eating (e.g., “Sometimes when I start eating, I just can't seem to stop”). Scores for each subscale are calculated by summing respective items. Internal consistency coefficients for Restraint scale items were .87, .86, .83, and .86 when daughters were ages 5, 7, 9, and 11, respectively. Internal consistency coefficients for Disinhibition scale items were .83, .84, .83, and .82 when daughters were ages 5, 7, 9, and 11, respectively.

We used principal-component factor analysis to reduce the above three scales—measuring weight concerns, dietary restraint, and dietary disinhibition—so as to generate a single construct that measured mothers' preoccupation with weight and eating at each time point. All three measures loaded highly on the single construct ($>.50$) at each time point. Mothers' preoccupation with their own weight and eating was a stable construct across the 6-year period (daughters' ages 5–11), with a stability coefficient of .72 ($p < .001$). On the basis of this evidence of stability, mothers' preoccupation with weight and eating scores were averaged over time to examine the long-term influence of this construct on mothers' attempts to influence daughters' weight and eating and daughters' restrained eating behavior. Higher scores indicate higher levels of mothers' preoccupation with their own weight and eating.

Maternal attempts to influence daughters' weight and eating—Maternal attempts to influence daughters' weight and eating was measured using two separate scales: the Restriction subscale from the Child Feeding Questionnaire (CFQ) developed by Birch et al. (2001), and the Encouragement of Daughters' Weight Loss Scale, developed in our laboratory. The Restriction subscale from the CFQ contains 8 items that assess the extent to which parents restrict their children's access to foods (e.g., “I intentionally keep some foods out of my child's reach”). All items are measured using a 5-point Likert-type scale. Internal consistency coefficients for items on the Restriction subscale were .84 and .85 when daughters were ages 9 and 11, respectively. Mothers' restriction of daughters' intake was stable from ages 9 to 11, with a stability coefficient of .74 ($p < .001$). On the basis of this evidence of stability, an average score was calculated to represent mothers' restriction of daughters' intake across ages 9–11. Mothers' restriction of daughters' intake is linked to daughters' eating in the absence of hunger and negative self-evaluation (Fisher & Birch, 1999, 2000). Higher scores indicate higher levels of maternal restriction of daughters' intake. Although scores on the Restriction subscale were available when daughters were ages 5 and 7, we only used data collected when daughters were ages 9 and 11 to create a composite measure that included a measure of maternal encouragement of daughters' weight loss.

The Encouragement of Daughters' Weight Loss Scale measures the ways in which mothers encourage daughters to lose weight by adjusting their food intake and/or level of physical activity. Item examples include “Have you ever talked to your daughter about how to diet?” and “Have you ever talked to your daughter about the things she needs to eat to lose weight?” For each subscale, items were summed ($yes = 1$, $no = 0$), with higher scores reflecting higher levels of encouragement to lose weight. Internal consistency coefficients for items on this scale were .91 and .92 when daughters were ages 9 and 11, respectively. Mothers' encouragement of daughters' weight loss was also stable across the 2-year period, with a stability coefficient of .70 ($p < .001$). On the basis of this evidence of stability, an average score was calculated that represented mothers' encouragement of daughters' weight loss across ages 9–11.

Maternal concern for daughters' weight—Concern for daughters' weight was measured using the Concerns About Child Overweight subscale from the CFQ. The Concerns About Child Overweight subscale contains three items measuring parents' concerns about their children becoming overweight or concerns that their children will have to diet to maintain a healthy weight. An example item is “How concerned are you about your child becoming overweight?” This scale has previously been linked to maternal attempts to control daughters' eating (Francis et al., 2001). Internal consistency coefficients for this scale were .89 and .85 when daughters were ages 9 and 11, respectively. Mothers' concerns about daughters' weight was stable across the 2-year period, with a stability coefficient of .66 ($p < .001$). On the basis of this evidence of stability, an average score was calculated representing mothers' concerns for daughters' weight across ages 9–11. Higher scores indicate higher concerns about daughters' weight.

Daughters' Measures

Daughters' restrained eating behavior—We used principal-components analysis to create a measure of daughters' restrained eating behavior by taking the average of the scores from Dutch Eating Behavior Questionnaire (DEBQ; van Strien, Fritjers, Bergers, & Defares, 1986) Restraint subscale and the ChEAT (Maloney et al., 1989) Dieting subscale. The DEBQ Restraint scale measures cognitive control of eating (dietary restraint) and was developed for use in adult populations. Thus, we used a modified version of the DEBQ Restraint scale when girls were age 9; the wording of items was simplified, and the number of response options was reduced from 5 to 3. The original scale was used when girls were age 11. Examples of items include “Do you try to eat only a little bit on purpose so that you won't get fat?” (child version)

and “Do you deliberately eat less in order not to become heavier?” (adult version). Average standardized scores were used to calculate girls' average restraint score at each time point. Standardized scores allowed us to compare responses on this scale over time, despite the change in response options. Internal consistency coefficients for the Restraint scale were .87 and .93 when daughters were ages 9 and 11, respectively.

The ChEAT was developed from the 26-item Eating Attitudes Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982), which is an abbreviated version of the EAT-40 (Garner & Garfinkel, 1979). An 8-item Dieting factor that measures daughters' inclination toward dieting behaviors was confirmed in this sample using confirmatory factor analysis (Sinton & Birch, in press). This factor is similar to a Dieting factor reported by others who have conducted factor analyses of this instrument (Kelly, Ricciardelli, & Clarke, 1999; Smolak & Levin, 1994), and it is associated with weight-management behaviors and lower body satisfaction. Item responses range from 0 to 4, and scores for each item are summed to create a dieting score. Higher scores indicate higher levels of reported dieting behaviors. The internal consistency coefficient for the Dieting scale was .66 when daughters were age 9 and age 11. This low coefficient alpha was a result of low variability in responses; a low internal consistency is likely to emerge for measures of behaviors that occur with low frequency, such as dieting behaviors. Daughters' DEBQ dietary restraint and ChEAT dieting attitudes were correlated at ages 9 ($r = .48, p < .001$) and 11 ($r = .49, p < .001$).

The construct of daughters' restrained eating behavior was relatively stable from age 9 to age 11 ($r = .58, p < .001$). On the basis of this evidence of stability, an average score was calculated representing daughters' average restrained eating behavior across ages 9–11. Higher scores on the restrained eating behavior construct indicate daughters' more frequent attempts to limit their food intake, with a specific emphasis on weight control.

Daughters' perceptions of maternal pressure to lose weight—Daughters' perceptions of maternal pressure to lose weight were assessed using a measure developed in our laboratory, based on Shisslak et al.'s (1999) Risk Factor Survey. The 4-item Maternal Influence Scale used in this study included items such as “Does your mother make sure that you don't eat too much so that you don't get fat?” and “Does your mother encourage you to lose weight?” The internal consistency coefficient for items on this scale was .61 when daughters were age 9 and age 11; the low internal consistency was a result of low variability in girls' responses. Daughters' perceptions of maternal pressure to lose weight were relatively stable from ages 9 to 11 ($r = .48, p < .001$). On the basis of this evidence of stability, an average score was calculated representing this construct across ages 9–11. Higher scores indicate daughters' perceptions of higher levels of pressure from mothers to lose weight.

Daughters' weight concerns—Daughters' concerns about weight were measured using an adapted version of the Weight Concerns Scale developed by Killen et al. (1994). The Weight Concerns Scale is a 5-item questionnaire that assesses fear of weight gain, worry about weight and body shape, the importance of weight, diet history, and perceived fatness. A modified form of this questionnaire was administered to girls at ages 9 and 11. Because this measure was originally developed for use with adolescents, the wording of the original scale was simplified, and the response format was reduced from 5 options to 3 for use with 9-year-olds. The original version of the scale was used when girls were age 11. Examples of items include “How afraid are you of getting fat?” (age-9 version) and “How afraid are you of gaining 3 pounds?” (age-11 version). An average weight concerns score was calculated at each age. Previous research using an adolescent sample reported that scores on the Weight Concerns Scale were linked to restrained eating and the development of disordered eating patterns (Killen et al., 1994). Weight concerns in 5-year-old girls in this sample predicted dietary restraint and the likelihood of dieting at age 9 (Davison, Markey, & Birch, 2003). Internal consistency coefficients in this

sample were .63 and .78 at ages 9 and 11, respectively. Daughters' concerns about weight were relatively stable from age 9 to age 11, with a stability coefficient of .55 ($p < .001$). On the basis of this evidence of stability, an average score was calculated representing girls' average weight concerns across ages 9–11. Higher scores indicate higher concerns about weight.

Daughters' weight status—Daughters' body mass index (BMI) scores were generated using the following equation: weight (kg)/height (cm)². Height and weight were measured by a trained staff member following procedures described by Lohman, Roche, and Martorell (1988). Children were dressed in light clothing and measured without shoes. Height was measured in triplicate to the nearest 10th of a centimeter with a stadiometer (Shorr Productions, Olney, MD); an average height value was calculated from the three measurements. Weight was measured in triplicate to the nearest 10th of a kilogram with an electronic scale (Seca Corporation, Birmingham, United Kingdom); an average weight value was calculated from the three measurements. Age- and sex-specific BMI percentiles were used to determine the prevalence of overweight in daughters in this sample. On the basis of standardized reference criteria (Kuczmarski et al., 2000), a BMI score corresponding to the 85th percentile was used to classify overweight in children.

Daughters' BMI z -scores were used in all analyses, because this variable is normally distributed and minimizes the influence of extreme scores. Daughters' BMI z -scores were tracked from age 5 to age 11 ($r = .73$, $p < .001$). On the basis of this evidence of stability, an average score was created representing daughters' average BMI z -score over time. Higher BMI z -scores provide an estimate of higher levels of adiposity.

Statistical Methods

All variables were either normally distributed or transformed to improve normality and reduce skewness. Spearman correlations were used to examine relationships among correlates of daughters' problematic eating. Descriptive statistics were generated for several background and maternal and child characteristics, and simple relationships among variables were examined using the SAS (Version 8.2) statistical package (SAS Institute, 2001). Path analysis was used to test a model that examined whether mothers who were more preoccupied with their own weight and eating made attempts to influence their daughters' weight and eating and whether these attempts to influence daughters' weight and eating were linked to daughters' problematic eating. In a modification of this model, we tested the hypothesis that daughters' perceptions of maternal pressure to lose weight mediated the relationship between mothers' attempts to influence daughters' weight and eating and daughters' restrained eating behavior. Path analysis was carried out using the AMOS (Version 5.0) software package (Arbuckle & Wothke, 2003). Statistical significance for all relationships was determined at a level of $p < .05$.

Results

Three sets of analyses were conducted. First, correlates of mothers' preoccupation with their own weight and eating, mothers' attempts to influence daughters' weight and eating, daughters' perceptions of maternal pressure to lose weight, and daughters' restrained eating behavior were examined. Second, a path model was tested to examine the influence of mothers' preoccupation with their own weight and eating on daughters' restrained eating behavior via mothers' attempts to influence daughters' weight and eating. Third, we examined whether relationships between mothers' attempts to influence daughters' weight and eating and daughters' restrained eating behavior were mediated by daughters' perceptions of maternal pressure to lose weight.

Maternal and Child Characteristics

Descriptive information for all major variables of interest appears in Table 1. On the basis of age- and sex-specific reference criteria (Kuczmarski et al., 2000), 19% of girls in this sample were classified as overweight at age 5. At age 7, 20% of girls were classified as overweight. Thirty percent were classified as overweight at ages 9 and 11. On average, mothers were slightly overweight at entry into the study, with a mean BMI score of 26.4 ($SD = 6.1$). Overweight in adults is defined as a BMI of 25 or higher (World Health Organization, 1998). On the basis of this criterion, percentages of mothers classified as overweight were 53%, 56%, 59%, and 59% when daughters were ages 5, 7, 9, and 11, respectively.

Mothers' Preoccupation With Their Own Weight and Eating

Mothers who were more preoccupied with weight and eating over time had higher BMI scores at entry into the study ($r = .49, p < .001$); thus, we adjusted for the influence of mothers' BMI at study entry on mothers' preoccupation with weight and eating in subsequent analyses. Mothers' preoccupation with weight and eating was not associated with maternal education ($p = .38$) or reported family income ($p = .76$) at entry into the study; these variables were not included as covariates in subsequent analyses.

Mothers' Attempts to Influence Daughters' Weight and Eating

Mothers' reports of restricting daughters' access to energy-dense snack foods and of encouraging daughters to lose weight were moderately correlated ($r = .35, p < .001$). Mothers who were concerned about their daughters' weight reported higher levels of restricting daughters' access to energy-dense snack foods ($r = .46, p < .001$) and higher levels of encouragement of daughters' weight loss ($r = .72, p < .001$). Mothers' concerns about their daughters' weight ($r = .62, p < .001$), reports of restricting daughters' intake ($r = .26, p < .001$), and encouraging daughters to lose weight ($r = .72, p < .001$) were positively linked to daughters' BMI z -scores over time. Because daughters with higher BMIs may have been eliciting these responses from mothers, we accounted for the influence of daughters' average BMI z -scores from ages 5 to 11 on relationships among maternal variables in path models.

Correlates of Daughters' Perceptions of Maternal Pressure to Lose Weight and Restrained Eating Behavior

Daughters' weight concerns were linked to perceptions of maternal pressure to lose weight ($r = .47, p < .001$) and restrained eating behavior ($r = .70, p < .001$). In addition, daughters' BMI z -scores were linked to daughters' weight concerns ($r = .57, p < .001$), perceptions of maternal pressure to lose weight ($r = .36, p < .001$), and restrained eating behavior ($r = .47, p < .01$). Because of these links, we adjusted for daughters' average BMI z -scores over time in path models predicting daughters' restrained eating behavior.

Predicting Daughters' Restrained Eating Behavior

Fit indices for the model predicting daughters' restrained eating behavior indicated that the initial model demonstrated poor fit before the addition of daughters' perception of maternal pressure to lose weight, $\chi^2(10, N = 173) = 116.4, p < .001$, as indicated by the following fit indices: comparative fit index (CFI) = .72; normed fit index (NFI) = .71. Adding daughters' perception of maternal pressure to lose weight to the model predicting daughters' restrained eating behavior resulted in a marked improvement in fit, demonstrating good fit: $\chi^2(7, N = 173) = 44.6, p < .001$ (CFI = .91; NFI = .89). Although the chi-square statistic was significant, chi-squares are highly dependent on sample size, which often results in a significant value when the fit of the model is adequate.

Mothers who were preoccupied with their own weight and eating reported higher levels of restricting daughters' intake of energy-dense snack foods ($r = .24, p < .01$) and encouraging daughters' to lose weight ($r = .32, p < .001$). Hence, mothers who were more preoccupied with their own weight and eating made more attempts to influence their daughters' weight and eating. These relationships were evident after accounting for the influence of mothers' weight status on mothers' preoccupation with weight and eating. Mothers' restriction of daughters' intake was not related to daughters' restrained eating behavior; however, mothers' encouragement of daughters' weight loss was positively linked to daughters' restrained eating behavior ($r = .42, p < .001$).

The results of the path analysis examining daughters' perceptions of maternal pressure to lose weight as a mediator between mothers' attempts to influence daughters' weight and eating and daughters' restrained eating behavior appear in Figure 1. Daughters' perceptions of maternal pressure to lose weight emerged as a partial mediator between mothers' encouragement of daughters' weight loss and daughters' restrained eating behavior; the association between mothers' encouragement of daughters' weight loss and daughters' restrained eating behavior was attenuated, but it remained significant ($r = .30, p < .001$). Mothers' restriction of daughters' intake was not related to daughters' perception of maternal pressure to lose weight ($p = .18$). The final model accounted for 43% of the variance in daughters' restrained eating behavior.

Discussion

Our aims were to determine whether mothers who were more preoccupied with their own weight and eating would make more attempts to influence their daughters' weight and eating and whether these attempts would be linked to daughters' restrained eating behavior. Our results indicate that mothers who were highly preoccupied with weight and eating reported higher levels of restricting their daughters' access to energy-dense snack foods and encouraging daughters to lose weight. Mothers' encouragement of daughters' weight loss was linked to daughters' restrained eating behavior across ages 9–11, but this relationship was partially mediated by daughters' perceptions of maternal pressure to lose weight over time. These relationships were independent of the influence of daughters' average weight status over time.

There is sufficient evidence that mothers who are invested in the eating domain place children at risk for developing problems with weight and eating as a result of child-targeted feeding practices that affect developing self-control of intake and maintenance of a healthy body weight (Birch & Fisher, 2000; Birch et al., 2003; Fisher & Birch, 1999; Johnson & Birch, 1994; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). In this study, mothers' restriction of daughters' intake of palatable, energy-dense snack foods did not promote daughters' restrained eating behavior. However, mothers' reports of encouraging daughters to lose weight were positively linked to daughters' restrained eating behavior. Thus, daughters may internalize mothers' encouragement to lose weight and may respond by making conscious efforts to control their weight by restricting the types and amounts of foods they eat.

Baker et al. (2000) examined intergenerational transmission of eating attitudes and behaviors, specifically assessing the influence of parental modeling of eating concerns and behaviors versus direct criticism of child eating or appearance on child eating concerns and dieting behaviors. In the present study, we examined the links between mothers' weight and eating concerns and maternal attempts to influence daughters' weight and eating via maternal restriction of daughters' intake or encouragement of daughters' weight loss. The next step was to determine whether daughters' perceptions of maternal pressure to lose weight mediated the relationship between maternal attempts to influence daughters' weight and eating and daughters' restrained eating behavior. Our results reveal that daughters' perception of maternal pressure to lose weight was a partial mediator; mothers who reported encouraging daughters

to lose weight had daughters who perceived more pressure from mothers to lose weight, which in turn was linked to daughters' restrained eating behavior.

In a study examining the links between parental control in child feeding and the emergence of dietary restraint and disinhibition in 5-year-old daughters, Carper, Fisher, and Birch (2000) reported that daughters' perceptions of parental control over their (i.e., daughters') eating were linked to daughters' restrained and disinhibited eating. However, parental reports of parental control were not related to daughters' restrained or disinhibited eating. Carper et al. reported data from the same sample used in the present study when daughters were age 5. The results from the present study show that 11-year-old daughters' perceptions of maternal pressure to lose weight and maternal reports of encouraging daughters to lose weight were highly linked. This different pattern of findings may represent a developmental change; as girls develop and become more aware of societal pressures to be thin, they may also become more aware of messages from mothers regarding their weight and eating.

Links between dietary restraint and weight concerns that emerged in 11-year-old girls in this study mirror the patterns of associations seen among adolescents and adults. Daughters who reported greater weight concerns also reported higher levels of dietary restraint. Similarly, mothers' restrained eating was linked to their weight concerns. Several studies have confirmed that weight concerns are one of the strongest predictors of weight-control practices and maladaptive eating behaviors among adolescents and adults (Killen et al., 1994; Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002; Neumark-Sztainer, Wall, Story, & Perry, 2003; Stice, Mazotti, Krebs, & Martin, 1998; Strong & Huon, 1998). A recent study reported that weight concerns and body satisfaction in 5-year-old girls (also drawn from the present sample) were relatively stable constructs from age 5 to age 9 (Davison et al., 2003). Five-year-old girls who were concerned about their weight were more likely to report restrained eating and maladaptive eating attitudes and dieting practices at age 9, independent of weight status.

Our racially and demographically homogenous sample limits generalizations to other populations and socioeconomic groups. We chose to study this group because chronic attempts at weight control, even in the absence of overweight, are common among middle-class girls and women (Adams et al., 2000; Schreiber et al., 1996). Recent work suggests, however, that overweight concerns and body dissatisfaction are prevalent in young boys and cross diverse ethnic and socioeconomic groups, highlighting the need to address these issues in diverse populations (Robinson, Chang, Haydel, & Killen, 2001).

In sum, mothers who were more preoccupied with their own weight and eating made more attempts to influence their daughters' weight and eating by restricting daughters' intake of energy-dense foods and encouraging daughters to lose weight. These weight- and eating-focused parenting behaviors were in turn associated with daughters' restrained eating. We found the strongest support for links between mothers' encouragement of daughters' weight loss and daughters' restrained eating behavior, partially mediated by daughters' perceptions of maternal pressure to lose weight. Several studies from our laboratory have provided evidence that maternal restriction of daughters' intake of palatable snack foods promotes daughters' overeating, particularly eating in the absence of hunger (Birch & Fisher, 2000; Birch et al., 2003; Fisher & Birch, 1999). Although both restriction and encouragement to lose weight were predicted by mothers' preoccupation with their own weight and eating, only encouragement to lose weight was linked to daughters' restrained eating behavior. It is disconcerting, however, that mothers in this study were not merely responding to daughters' weight status when encouraging daughters to lose weight. Mothers may encourage daughters to lose weight as a means of protecting daughters from the psychosocial and health problems associated with increased weight. However, the results of this study illustrate that these maternal attempts may be maladaptive, because they are linked to restrained eating in 11-year-old girls. One question

is whether elevated restrained eating behavior may place these young girls at risk for disordered eating in adolescence. Another question is whether restrained eating is an effective means of reducing weight status, particular given the finding in this sample that girls with higher BMI z-scores reported higher levels of restrained eating behavior.

Societal pressures to be thin are widespread in an obesigenic environment, making it difficult to shift children's focus away from weight, body shape, and eating behavior. Increasing secular trends in overweight among children (Ogden, Flegal, Carroll, & Johnson, 2002) and adults (Flegal, Carroll, Ogden, & Johnson, 2002) make it likely that preoccupations with weight and eating will persist. Although increased attention is being directed at decreasing disordered eating symptomology in children and adolescents, it is of paramount importance to identify the characteristics of parents and families that place young children at risk for developing problematic eating behaviors. The findings of this study suggest that mothers' attitudes about their own and their daughters' weight and eating are one point of intervention. By altering family environments in which children are exposed to parental modeling of problematic eating behaviors and an overemphasis on children's weight and eating, health professionals may be able to stem the development of patterns of problematic eating behaviors in children.

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Figure 1.

Path model predicting daughters' restrained eating, with daughters' perceptions of maternal pressure to lose weight as a mediator. Mothers' preoccupation with their own weight and eating was created by averaging measures obtained when daughters were ages 5, 7, 9, and 11; all other major variables were averaged across daughters at ages 9 and 11. The model is adjusted for the influence of maternal weight status at entry into the study on mothers' preoccupation with weight and eating. Adjustments were also made for the influence of daughters' average body mass index *z*-scores from ages 5–11 on all other variables in the model; only adjusted coefficients are presented in figure. * $p < .01$. ** $p < .001$.

Table 1**Mean Scores of Maternal and Child Major Variables**

Variable	<i>M</i>	<i>SD</i>	Range
Maternal			
Preoccupation with weight and eating (ages 5–11)	–0.0	1.3	–2.9 to 2.9
Restriction (ages 9–11)	2.5	0.8	1.0 to 4.6
Encouragement of weight loss (ages 9–11)	–2.3	0.7	–3.0 to –0.8
Child			
Perception of pressure to lose weight (ages 9–11)	–2.1	0.6	–3.0 to –0.9
Restrained eating (ages 9–11)	0.1	2.1	–2.2 to 6.9
Body mass index (BMI) ^a	15.9	1.6	13.1 to 25.3
BMI percentile ^a	59.8	26.6	1.5 to 99.7

Note. Mean scores for each variable were created by averaging across the time period given in parentheses.

^aBMI variables were measured at study entry, when daughters were 5 years old. Mean BMI percentile is based on standardized reference values (Kuczmarski et al., 2000).