

Parental Feeding Style and the Inter-generational Transmission of Obesity Risk

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Abstract

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Objective: This study was designed to determine whether a community sample of obese mothers with young children used different feeding styles compared with a matched sample of normal-weight mothers. Four aspects of feeding style were assessed: emotional feeding, instrumental feeding (using food as a reward), prompting/encouragement to eat, and control over eating.

Research Methods and Procedures: Participants were from 214 families with same-sex twins; 100 families in which both parents were overweight or obese and 114 in which both parents were normal weight or lean.

Results: We found that obese mothers were no more likely than normal-weight mothers to offer food to deal with emotional distress, use food as a form of reward, or encourage the child to eat more than was wanted. The obese and normal-weight mothers did differ on “control”; obese mothers reported significantly *less* control over their children’s intake, and this was seen for both first-born and second-born twins. Twin analyses showed that these differences were not in response to children’s genetic propensities, because monozygotic correlations were no greater than dizygotic correlations for maternal feeding style.

Discussion: These results suggest that the stereotype of the obese mother, who uses food in nonnutritive ways so that her child also becomes obese, is more likely to be myth than fact. However, the results raise the possibility that lack of

control of food intake might contribute to the emergence of differences in weight.

Introduction

Family feeding styles have long been assumed to contribute to the intergenerational transmission of obesity. This idea has emerged partly from clinical observations, where adult obese patients in therapy identify their parents’ attitudes to food as being at the root of their own maladaptive eating habits (1–4). It has also come from clinicians working in the field of childhood obesity, who have identified the family feeding environment as contributing to the development of obesity (5–8). Four feeding patterns in particular have been under suspicion as contributing to the development of obesity. Feeding in response to emotional distress (emotional feeding) and using food as a reward (instrumental feeding) are both assumed to encourage the child to associate eating with cues other than hunger and thereby increase the risk of eating in excess of physiological need. A third feeding practice that has been implicated is excessive prompting or encouragement to eat, deriving either from the parents’ enthusiasm to see the child eating food that has been carefully prepared or the belief that a heavier child is a healthier one (2,3,8). Finally, there have been suggestions that parental restriction of high-fat foods might be related to improved quality of children’s diets and thereby, perhaps, reduce the likelihood of overweight (9,10).

Despite its popular appeal, evidence that parental feeding style influences the development of obesity is sparse. Observations from clinical settings where obese adults recollect their childhood feeding experiences, or from clinicians noting the feeding practices of parents of their young obese patients, have limited value because of the paucity of comparable information from normal-weight patients. A few studies have included normal-weight controls and showed that obese patients recalled more parental use of food as a reward and greater control than non-obese patients (2–4). However, these retrospective accounts may be colored by the obese patients’ current difficulties with eating and

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weight, so they need to be confirmed by direct investigations of parental behavior, preferably before the onset of the weight problem.

In the scientific literature there have been sporadic attempts to investigate parental feeding styles in relation to children's obesity risk. One approach has been to relate feeding styles in families to the weight of the child, on the assumption that the differing feeding styles could have caused the weight variation. However this has not produced consistent results. Parental prompts and encouragement to eat have been shown to be positively associated with children's weight in some studies (11,12) but not others (13–15). Parental control has been also investigated in a limited number of studies, and again the results have been varied, from finding no differences in controlling behaviors between parents of obese and non-obese children (14) to greater parental control over eating for overweight girls but not boys (16).

Most studies in this area have used data from one child per family, so that each family is designated as the family of an obese child or the family of a normal-weight child. Two studies have used a discordant sib-pair design. One, which had just four families, found that parents gave larger portions to the obese boy (17). The second was based on data from 18 families and found no evidence for different feeding practices for the obese and the non-obese sibling (18).

Cross-sectional associations between children's weight and parental feeding will never provide conclusive evidence relating to causal effects, because although the observed parental behavior might be a cause of the child's overweight, it might equally be responsive to the child's weight (e.g., greater control being exerted in response to the child appearing to be overweight). Alternatively it might simply reflect shared genes in the domains of eating and feeding (19).

An alternative approach is to use parental obesity status as an indicator of risk, because it has been established as a strong early-childhood predictor of adult obesity (20,21). Comparisons of feeding styles in families with obese and non-obese parents might therefore give some indication of the parental behaviors that are associated with the inter-generational transmission of obesity risk. There is strong evidence that genetic factors contribute importantly to familial resemblance for weight and overweight (22,23). Nevertheless, about one-quarter of the variance in weight is caused by environmental factors, and parental feeding style could be part of the environmental influence.

Using parental weight status to index the child's risk of obesity is particularly informative when the child is not yet obese, because then it cannot be argued that the parental feeding style is a response to the child's obesity. One of the few studies to take this approach examined parental control and the use of food as a reward, in relation to maternal adiposity, in a large sample of families with preschool

children (24). The mother's adiposity proved to be unrelated to her feeding style, but there were few obese mothers in the sample, and the measures of feeding style had comparatively low reliability, which would limit the power of the study to detect associations. In addition other aspects of feeding style, such as parental encouragement to eat or emotional feeding, were not assessed.

The present study was therefore designed to determine whether a community sample of obese mothers with young children used different feeding styles from a matched sample of normal-weight mothers. Four aspects of feeding style were assessed: emotional feeding, instrumental feeding (using food as a reward), prompting/encouragement to eat, and control over eating. If the clinically derived, feeding-style hypotheses are correct, we would expect to see that obese parents, whose children will have a much higher risk of obesity, would be more likely to feed their children for emotional and instrumental reasons and to encourage and prompt eating more. They might also exert less control over their children's eating, although there has been little agreement in the literature on the role of control. In addition, we examined two other factors that have been hypothesized to be linked with maternal feeding style: the mother's own eating style and the child's weight. Maternal eating style has been linked with maternal feeding style, particularly in relation to dietary restraint, where mothers who are trying to control their own weight seem to be more likely to restrict their child's intake (25). We also looked at associations between children's weight and parental feeding style, because if variation in parental feeding style is causing variation in weight, parents who are more encouraging of eating might have fatter children, whereas if parental feeding style is responsive to weight, then parents would be likely to be more encouraging if their children are relatively thinner. Finally, the children were selected from a large and representative twin sample so that future analyses could assess the extent to which any phenotypic associations between parental feeding style and children's weight are mediated genetically.

Research Methods and Procedures

Participants and Procedures

Participants were from 214 families with same-sex twins: 100 families in which both parents were overweight or obese and 114 in which both parents were normal-weight or lean. The families were drawn from the Twins Early Development Study (TEDS) which includes 10,000 pairs of twins born in England between 1994 and 1995, representing more than one-half of the twins born in those years. The TEDS sample has been shown to be reasonably representative of U.K. families with young children in relation to parental education and occupation (26). Families with overweight and obese parents (called "obese" families) were

selected on the basis that the mother's "reported body mass index (BMI)" (calculated from her reported weight and height)¹ was at least 28.5 kg/m² and the father's "reported BMI" was at least 25 kg/m². Both parents in the control families (called "lean" families) had reported BMIs <25 kg/m² and were chosen to come from the same areas of the U.K. and to provide an approximate match in terms of social class.

A total of 231 families were contacted by letter and telephone and invited to participate in a study of their children's eating habits. Of those contacted, 214 families (with 428 twin children) agreed to take part. Families were visited in their home, where mothers and children were weighed and measured, and mothers completed questionnaires to assess their feeding and eating styles.

Measures

Demographic Characteristics. Parental age, occupation, and educational level were assessed from the questionnaire sent to the whole TEDS sample in 1997 and 1998. Fathers' occupations were classified according to the Registrar General's Classification of Occupations from Class 1 (professional) to Class V (unskilled manual) (27). For the purposes of matching the lean to the obese families, they were grouped as manual and nonmanual occupations. Mothers' educational level was likewise classified into two groups, representing having achieved no more than the minimal English educational qualifications (no qualifications, CSEs, GCSEs, or O-levels) or having achieved more qualifications (A-levels, diploma, degree).

Anthropometric Characteristics. Height and weight were self-reported by the parents as part of the TEDS 3-year assessment. At the home visits, mothers' and children's heights were measured to the nearest 0.5 cm using a measuring tape, and weights were measured on a Soehnle digital electronic scale. Children's percentage of body fat was also assessed using bioelectrical impedance analysis (Maltron BF-906 Body Fat Analyzer; Maltron Ltd, Essex, United Kingdom). BMI was used as the index of adiposity for the children (28). Overweight and obese status were identified in relation to the International Obesity Task Force reference standard (29).

Maternal Eating Behavior. Maternal eating style was assessed using an abbreviated version of the Dutch Eating Behavior Questionnaire (30), which includes scales for restrained, emotional, and external eating. The full version of this questionnaire has good reliability and validity (31). In the present sample, the scales had high Cronbach's α (restrained eating, $\alpha = 0.90$; emotional eating, $\alpha = 0.92$; external eating, $\alpha = 0.82$).

Parental Feeding Style. Feeding style was assessed with the Parental Feeding Style Questionnaire, which was developed for this study. The items for the first version of the questionnaire came from a review of the clinical and experimental literature on parents' feeding behaviors, sampling existing measures (24,32), and carrying out semistructured interviews with a sample of 20 mothers. The first version contained 52 items relating to feeding style and was pre-tested with two unselected samples of parents from schools in London ($n = 131$ and $n = 183$) to reduce the number of items and select those that produced the most internally coherent scales. The final 27-item version contained four scales: emotional feeding (e.g., I give my child something to eat to make him feel better when he is upset); instrumental feeding (e.g., I reward my child with something to eat when she is well-behaved); prompting and encouragement to eat (e.g., I praise my child if she eats what I give her); and control over eating (e.g., I decide how many snacks my child should have). In each case the response options were "I never do; I rarely do; I sometimes do; I often do; I always do." Scale scores were obtained by calculating the means of the items comprising each scale. This version of the questionnaire was sent to a third sample of parents recruited from nursery schools and from parents who had responded to an advertisement for participants for research on family-eating patterns. A total of 221 (72%) of 308 questionnaires that were sent out were returned complete (117 boys and 104 girls; mean age, 5.6 ± 1.5 years). Internal reliability coefficients (Cronbach's α) were calculated for each scale and were as follows: emotional feeding, $\alpha = 0.65$; instrumental feeding, $\alpha = 0.85$; prompting or encouraging to eat, $\alpha = 0.69$; control over eating, $\alpha = 0.77$. Test-retest reliability (Pearson correlations) was assessed by sending a second copy of the questionnaire after a period of 2 weeks and correlating scores at time 1 and time 2 for each scale. A total of 166 parents (75%) returned the second questionnaire. There were no differences in gender distribution, age, or time 1 scale scores between those who completed and did not complete the questionnaire at time 2. Test-retest reliability for the four scales were as follows: emotional feeding, $r = 0.76$, $p < 0.001$; instrumental feeding, $r = 0.82$, $p < 0.001$; prompting or encouraging to eat, $r = 0.76$, $p < 0.001$; control over eating, $r = 0.83$, $p < 0.001$.

Statistical Analyses

The feeding styles of the obese and normal-weight mothers were compared using Student's t tests. The relationships between maternal eating behavior and feeding style and between child's BMI and feeding style were examined using Pearson correlation coefficients and partial correlations. In each case, two separate analyses were carried out, first using the data for the first-born twin and then for the second-born twin. This procedure avoids the issue of lack of independence of sibling data, and it provides a within-

¹ BMI calculated from reported height and weight substantially underestimates true BMI among the obese (see Results), and therefore, the expected BMI in the obese group would be closer to the accepted cut-off for obesity (30 kg/m²).

Table 1. Demographic and anthropometric characteristics of the families (percentages or means \pm SD)

	Lean families (n = 114)	Obese families (n = 100)	Difference (p)
Mother's reported BMI	22.30 \pm 1.69	33.74 \pm 3.72	0.001
Mother's measured BMI	23.28 \pm 2.33	36.00 \pm 4.59	0.001
Father's reported BMI	22.93 \pm 1.3	29.23 \pm 3.17	0.001
Mother's age	34.88 \pm 3.93	34.78 \pm 4.67	ns
Father's age	38.26 \pm 5.01	38.56 \pm 5.34	ns
Father's occupation			
Manual	46%	46%	ns
Nonmanual	54%	54%	

BMI, body mass index; ns, not significant.

family replication. All analyses were conducted using SPSS v10.0 (SPSS Inc., Chicago, IL).

Results

Demographic and Anthropometric Differences

Age, occupation, and educational level of the two groups of parents are shown in Table 1. There were no differences between the groups in the mothers' or fathers' ages, fathers' socioeconomic status, or mothers' educational level. Re-

ported BMIs for the mothers in the two groups differed by more than 3 SDs and for fathers by more than 2 SDs. The mothers' BMIs, calculated from measured weight and height, were substantially higher than their BMIs based on reported weight and height (36.0 vs. 33.7 kg/m² for the obese mothers and 23.3 vs. 22.3 kg/m² for the normal-weight mothers), although there was a very high correlation between the two values ($r = 0.93, p < 0.001$).

Children from the two groups were of similar age, gender distribution, and zygosity (see Table 2). As expected,

Table 2. Anthropometric characteristics of the children (percentages or means \pm SD)

	Children from normal-weight families (n = 228)	Children from obese families (n = 200)	Difference (p)
Age (years)	4.43 \pm 0.33	4.42 \pm 0.36	0.91
Range	3.8 to 5.2	3.9 to 5.3	
Gender			
Girls	49%	55%	0.20
Boys	51%	45%	
Zygosity			
DZ	50%	54%	ns
MZ	50%	46%	
Weight (kg)	17.53 \pm 2.48	18.30 \pm 2.81	0.003
Height (cm)	104.75 \pm 4.78	104.90 \pm 5.28	0.75
BMI	15.93 \pm 1.48	16.56 \pm 1.71	0.001
Percentage of body fat	19.50 \pm 4.55	20.08 \pm 4.95	0.22
Overweight*	13.6%	24.5%	0.004
Obese*	1.3%	7%	0.003

* Criteria from Cole et al. (29).

DZ, dizygotic; MZ, monozygotic; BMI, body mass index.

Table 3. Mean, range, validity, and reliability of the Parent Feeding Style Questionnaire

	Number of questions	Mean score \pm SD	Range of scores	Cronbach's α	Test-retest reliability correlation (from previous data)
Control over eating (1 to 5)	10	4.0 \pm 0.5	2.5 to 5.0	0.81	0.83*
Prompting/encouragement (1 to 5)	8	3.9 \pm 0.5	2.4 to 5.0	0.74	0.76*
Instrumental feeding (1 to 5)	4	2.3 \pm 0.7	1.0 to 4.3	0.67	0.76*
Emotional feeding (1 to 5)	5	1.9 \pm 0.6	1.0 to 3.6	0.83	0.82*

* $p < 0.001$.

weight and BMI were slightly higher in the children from the obese families, although the difference in percentage of body fat was not significant. Significantly more children from the obese families were overweight and obese.

Feeding Style

The feeding style data were analyzed initially to confirm that the scales still had adequate reliability when used with the present sample. Cronbach's α for the four scales were as follows: control over eating ($\alpha = 0.81$), prompting or encouraging to eat ($\alpha = 0.74$), instrumental feeding ($\alpha = 0.67$), and emotional feeding ($\alpha = 0.83$; see Table 3).

Based on the average scores, most mothers reported comparatively high levels of control (4.0 of a maximum of 5) and prompting (3.9 of 5), with lower levels of instrumental feeding (2.3 of 5) and emotional feeding (1.9 of 5). There were no significant differences in any aspect of feeding style between first-born and second-born twins or between girls and boys.

Differences in feeding styles reported by obese and normal-weight mothers are shown separately for first-born and second-born twins in Table 4. Obese mothers reported slightly lower levels of control for both their children than normal-weight mothers. The effect size is about one-third of a SD (i.e., $d = 0.36$). There were no significant differences for prompting or for emotional feeding. In the results from the first-born twins there was a tendency for obese mothers to report slightly *lower* levels of instrumental feeding, but the difference was not significant for the second-born twins.

Maternal Eating Style and Feeding Style

Consistent with the existing literature, obese mothers had higher levels of restrained eating and emotional eating than normal-weight mothers (see Table 5). The effect size is modest for restrained eating ($d = 0.39$) but moderate for emotional eating ($d = 0.65$). There was no difference between the two groups in external eating scores.

If mothers feed their children in the same way that they feed themselves, then emotional feeding should be more

common among mothers who are emotional eaters, instrumental feeding might be more common among mothers who are external eaters, and restrained mothers might be expected to report more control and less encouragement to eat. The results were calculated separately for the obese and normal-weight families because there were significant group differences in eating style, and the results were repeated for first-born and second-born twins (see Table 6 for results from first-born twins). As predicted, mothers who had higher emotional eating scores reported higher levels of emotional feeding ($r = 0.34$ for "lean" mothers and $r = 0.36$ for "obese" mothers, $p < 0.001$), and these effects were unchanged by controlling for maternal BMI. Mothers who had a more external eating style were more likely to report instrumental feeding ($r = 0.24$; $r = 0.25$, $p < 0.01$). However there was no sign that restrained eating was associated with any feeding style in either group. This is unlikely to be caused by range restriction, because the full range of restraint was expressed in both groups of parents, and in addition, the correlations remained nonsignificant if data from the two groups were combined. The results shown are for the first-born twins, but they replicate exactly with the second-born twins.

We also compared parental feeding styles for the obese and non-obese children within each family type and found no evidence for differential feeding in the obese sub-group.

Children's Weight and Maternal Feeding Style

If differences in maternal feeding style cause variation in children's weight, mothers who feed their children more (e.g., are more encouraging) might be expected to have heavier children, whereas if maternal feeding style is responsive to children's weight, then heavier children might be expected to be fed in a more restrictive fashion. Table 7 shows the correlations between children's weight and maternal feeding style across the whole sample, for both first- and second-born twins. The correlations were almost uniformly nonsignificant and were unchanged by controlling for mother's BMI. The one correlation that reached conven-

Table 4. Mothers' feeding style—scores on the Parent Feeding Style Questionnaire (Means ± SD)

	First-born twins			Second-born twins		
	Normal-weight families (n = 114)	Obese families (n = 100)	Difference (p)	Normal-weight families (n = 114)	Obese families (n = 100)	Difference (p)
Control over eating	4.05 ± 0.48	3.87 ± 0.52	0.01	4.04 ± 0.48	3.86 ± 0.52	0.01
Prompting/encouragement	3.88 ± 0.43	3.95 ± 0.56	0.33	3.87 ± 0.42	3.95 ± 0.57	0.29
Instrumental feeding	2.40 ± 0.67	2.21 ± 0.64	0.04	2.37 ± 0.68	2.25 ± 0.67	0.19
Emotional feeding	1.87 ± 0.63	1.83 ± 0.63	0.68	1.89 ± 0.63	1.86 ± 0.65	0.69

tional levels of significance showed that heavier first-born children had mothers who reported more prompting and encouragement, but this was not replicated in the results for the second-born twin.

Twin Analysis of Maternal Feeding Style

The lack of associations between parental feeding and child weight eliminated the need for our planned use of the twin design to decompose associations between parental feeding and child weight into genetic and environmental components of covariance. Nonetheless, we were able to use the twin method to conduct a more general investigation of the extent to which parental feeding is a response to any genetic differences between children, not just body weight. If differences in maternal feeding style are responsive to children's genetic propensities for weight or any other characteristics, a twin analysis would be expected to show monozygotic correlations that are greater than dizygotic correlations for maternal feeding style. The monozygotic and dizygotic intraclass correlations are, respectively, 0.95 and 0.96 for control feeding, 0.91 and 0.96 for emotional use of food, 0.92 and 0.92 for encouragement/prompting, and 0.90 and 0.92 for instrumental use of food. This consistent pattern of extremely high twin correlations for both MZ and DZ twins indicates that maternal feeding style is not a response to genetic differences between children.

Discussion

The aim of this study was to test the commonly held belief that parental feeding styles might contribute to children's obesity risk. Most studies have used a design in which they compare families of obese children with families of non-obese children. However, in the light of the possibility that feeding style might be a response to the child's weight (19), we identified at-risk status in the children by family history of obesity. Comparison of child-feeding styles between obese and non-obese parents, where the offspring are not yet obese, is one way of examining the processes that might contribute to the intergenerational, and probably genetic, transmission of obesity risk.

The four aspects of feeding style that we assessed (emotional feeding, instrumental feeding, encouragement, and control) have all been implicated in, or at least suspected of being part of, the familial risk environment, either by regulating energy consumption directly (e.g., prompting to eat large meals) or by leading the children to become poor regulators of their own energy intake (emotional feeding). Our results showed that obese mothers were no more likely than normal-weight mothers to offer food to deal with emotional distress, to use food as a form of reward, or to encourage the child to eat more than he or she wanted to. These negative results are similar to those reported by Sallis et al. (24), and together these studies call into question the

Table 5. Mothers' eating style—scores on the Dutch Eating Behaviour Questionnaire (Means ± SD)

	Normal-weight mothers (n = 114)	Obese mothers (n = 100)	Difference (p)
Restrained eating	2.67 ± 0.98	3.04 ± 0.90	0.005
Emotional eating	2.11 ± 0.83	2.75 ± 1.15	0.000
External eating	3.05 ± 0.55	3.11 ± 0.77	ns

ns, not significant.

Table 6. Correlations between maternal eating style and maternal feeding style: top values in each row are for the normal-weight mothers and bottom values for the obese mothers

Maternal eating style	Maternal feeding style			
	Control over eating	Emotional feeding	Instrumental feeding	Prompting/encouragement
Restrained eating	-0.08	0.12	0.15	-0.01
	0.01	0.17	0.18	0.06
Emotional eating	-0.14	0.34‡	0.31‡	0.02
	0.14	0.36‡	0.29†	0.18
External eating	-0.02	0.22*	0.24†	-0.02
	0.26†	0.17	0.25*	0.26*

None of these are modified by controlling for mother's body mass index.

**p* < 0.05.

†*p* < 0.01.

‡*p* < 0.001.

idea that obese parents play an active role in determining their children's future weight trajectory through the way that they feed them. The stereotype of the obese mother who uses food in nonnutritive ways, so that her child too becomes obese, is more likely to be myth than fact (33).

The obese and normal-weight mothers did differ on one aspect of feeding style, namely exerting control over the children's intake, where obese mothers reported slightly, but significantly, *less* control, and this effect emerged for both first-born and second-born twins. In modern homes, there are many foods that children enjoy and would, in the view of many parents, eat to the exclusion of healthier foods if they were allowed to. Control of some sort is therefore likely to be an essential part of managing children's diet. There have been relatively few other investigations of control in relation to obesity risk. Adult obese patients seem to vary in their reports of their parents' control, with some saying that there was too much restriction and others recalling excessive amounts of food being offered (4,34), but the variation here may relate to the obese patient's early weight status. Sallis et al. (24) failed to find any association between adiposity and parental control, but they assessed control with a somewhat weaker scale ($\alpha = 0.39$), and the maternal weight range was also limited, so their negative finding may not be entirely incompatible with the present results. Interestingly, they did find that fatter mothers were more likely to purchase food items that the child asked them to buy after seeing them on TV. In this respect, the fatter mothers may therefore have been more compliant with their children's food choices. One other study has examined maternal restriction of snack foods (an aspect of control) in a small sample of mothers of children in a daycare center

and found a significant negative correlation with maternal BMI (35), supporting the present results.

The finding of differential control in obese and normal-weight mothers has some resonance with findings from studies with obese children. Parents of obese children seemed to be more neglectful than parents of non-obese children, which might be linked to lower control (36,37). Obese children have also been found to eat fewer vegetables than normal-weight children (38), and because eating vegetables is almost always something that children have to be cajoled to do, this might indicate differential control. In two small studies, a pattern of greater parental control in families with fatter children emerged, at least for girls (16,35). However, a much larger investigation in a population sam-

Table 7. Correlation between twins' BMI and mothers' feeding style

	First-born twin	Second-born twin
Control over eating	0.03	-0.04
Prompting/encouragement	0.19*	0.06
Emotional feeding	0.03	0.04
Instrumental feeding	0.00	-0.02

* *p* < 0.01.

None of these are changed by controlling for mother's body mass index.

ple of 8-year-olds (39) found no association between parental control and boys' weights, whereas parents of heavier girls reported *less* control.

Parental control can be regarded as protective (i.e., parents restrict food to control the child's weight), but there has also been a view that parental control could prevent the child from learning to regulate its own consumption. Indeed, the finding of a positive correlation between parental control and child weight is interpreted as if parental control has caused the child's weight to increase (16). Some support for this model comes from the work of Fisher and Birch (25,40), which showed that mothers' reported restriction of high-fat and "junk" foods was associated with higher intake of food in a laboratory test. If restriction does prove to be a counter-productive strategy, important issues will be raised regarding feeding advice to parents. However, in the context of the present results, the parents of the high-risk children showed *less*, not more control, so any issues concerning possible adverse effects of excessive control don't seem to be particularly salient in understanding the development of weight problems in children from obese families.

Several studies show that higher social class mothers are more likely to restrict their child's access to fatty and sugary foods and snacks (10,41), and this seems to track into the children eating healthier diets later when they have more choice over what they eat (10). The families in the present study were matched for social class, thus, social class was not the confounder of the findings. Longer-term follow-up studies might usefully examine whether parental control during childhood is a protective influence against overconsumption of high-energy-dense foods and subsequent weight gain. If it is, differences in parental control might contribute to explaining the social-class differences in weight that emerge as children develop.

Whereas the primary question of this study was whether there were feeding-style differences between fat and thin parents, we were also interested in other factors, such as the mother's own eating style or the child's weight, which might shed light on the variation in feeding style. Other research has indicated that parents who are more restrained are more likely to restrict their children's intake (25,35), but in the present study, maternal restraint was not associated with any aspect of feeding style, either for boys or girls, or for the fattest children compared with the other children. However, emotional eating by the mother was associated with emotional feeding of the child, whereas externally cued eating was associated with more instrumental feeding. This may reflect the mother's tendency to treat her children as she treats herself, or more tentatively, it might be mediated by the children of emotionally-eating mothers being more inclined to want to eat when emotionally distressed (i.e., the child's eating style resembling the mother's eating style), and the maternal feeding practice being responsive to this.

Finally, we examined the association between feeding style and children's weights. There was a significant range of BMI among the children in the sample (from 12 to 25 kg/m²) which allowed us to examine the association between children's BMI and maternal feeding style and gain some sense of whether the various feeding styles were likely to be responsive to children's weight. The results of these analyses suggested that, at least at this young age, parents of fatter children were no more likely to try to discourage their children from eating than parents of thinner children. Nor, if the children were divided into the obese vs. the rest, was there evidence for any differential feeding for the obese subgroup, although the power for this analysis was extremely low. The lack of associations between parental feeding and child weight eliminated the need for our planned use of the twin design to decompose associations between parental feeding and child weight into genetic and environmental components of covariance.

How do the present results fit in with existing knowledge about the genetics of obesity? Genetic research has demonstrated that most of the familial risk of obesity is genetic, and that the environmental effect is largely related to non-shared environment (19,22,23). However, this does not imply that the family feeding environment plays no role in transmitting the obesity risk. Genetic research suggests that as much as one-quarter of the variance in weight is accounted for by environmental factors. Although these environmental factors are largely of the nonshared variety, it is possible that parental feeding style differs for two children growing up in the same family, thus contributing to non-shared environmental influence on their children's weight. However, our results indicate that parental feeding style is very similar for twins, whether MZ or DZ, and is unlikely to be an important source of nonshared environment.

Most importantly, in an area like obesity, where belief in the power of parenting practices is so entrenched in both lay and professional discourse, prevailing beliefs need to be tested directly. We need to have the statistical power to be confident that overweight parents are not feeding their children in ways that are likely to increase their obesity risk. The present results may be helpful in dispelling some myths about obesity (33) and in providing more straightforward evidence for clinicians than the indirect information deduced from patterns of correlations between family members. The findings from this study, the largest in the area to date, provide evidence that aspects of feeding style being under suspicion by clinicians are unlikely to play much of a part in the intergenerational transmission of risk, although they could, of course, be part of the environment that promotes weight gain. The exception was the group differences in control, which indicated that the fatter mothers exerted *less* control. This finding certainly seems worthy of follow-up, in the light of the ongoing debate on whether parental control can successfully reduce obesity risk (envi-

ronmental or genetic), or whether it merely yields children who do not develop self-control (25).

There are limitations in the design of this study. It was carried out with twin families, and it is possible that they are unusual. However, there is no evidence that associations between parental and child weight are different in twins, and the twin data have been particularly prominent in establishing the role of genetic factors in the familial similarities in weight. In the context of the present study, the twin design provided the opportunity to replicate the differences in parental feeding style in relation to each child. Two unpredicted associations were seen in the data from the first-born twin, and that they were not replicated with the other child prevented us from taking them seriously. Generalization of the results is also limited by the fact that the participants were from intact families and were predominantly white. Other social and cultural groups could show different patterning of feeding and weight. Another limitation was that parental feeding style was self-reported, and although the instrument used in this study was shown to be internally consistent and reliable over time, this does not tell us whether parents are accurate reporters of their feeding habits. This same limitation has applied to almost all of the research in this field, with the instruments developed by Sallis et al. (24) and Birch and Fisher (25) being of the same kind. There are studies that rely on observation of family meals (14,15), but these raise concerns about reactivity. The Parental Feeding Style Questionnaire used in this study could have range limitations, particularly for the subscales where parents scored consistently high, and that would reduce the chance of finding significant effects. Future work needs to address the validity of parental reports of feeding behavior to take forward this area of work. Most importantly, these are cross-sectional data that speak to the issue of the feeding practices of parents but do not directly address associations between feeding practices and the later development of obesity. Evidence for associations between parental feeding style and the subsequent weight trajectory of the children needs to be established through longitudinal follow-up studies. There has been a paucity of longitudinal studies to see whether there are any parental feeding styles that might either be part of the feeding environment for an individual child or might moderate the genetic obesity risk. Given the dramatic increase in obesity that has been observed in recent years, and particularly the increase in childhood obesity, investment in research into the development of obesity over the childhood years should be given a high priority.

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