
ORIGINAL RESEARCH

Child feeding practices and perceptions of childhood overweight and childhood obesity risk among mothers of preschool children

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Abstract

Aim: The present study assessed the relationship between maternal attitudes, beliefs and child feeding practices. It was hypothesised that: (i) maternal control over feeding would increase when mothers perceived their children as over- or underweight and were concerned about the weight status of their children; and (ii) mothers would express more concern about their daughters' weight, and report higher levels of control over feeding as a result.

Methods: Participants included 112 mothers and their children aged 2–6 years who were attending swim lessons at a Central Coast swim school. Mothers completed the Child Feeding Questionnaire to assess maternal attitudes, beliefs and control over child feeding. Child and maternal body mass indexes were measured. Correlational analyses, t-tests and multiple regression analyses were performed.

Results: Mothers reported a high overall level of control in child feeding, and a low level of concern for child weight. Child overweight and obesity were marginally lower than reported in previous studies. Mothers reported more concern for their daughters' weight, but did not report increased control over feeding based on child gender. Pressure to eat was negatively associated with maternal education, suggesting a link between socioeconomic status and child feeding practices. Mothers displayed higher levels of parental control over obese than normal-weight children, suggesting that they accurately assessed the weight status at the obese level.

Conclusion: Mothers may be able to detect obesity in their children, but not overweight. Mothers may also be unconcerned about their sons' weight, and this discrepancy should be investigated in clinical and educational settings. Nutrition education and child obesity prevention and treatment programs should take maternal attitudes, perceptions and child feeding practices into account when planning interventions.

Key words: child, childhood obesity, maternal attitude, overweight.

INTRODUCTION

Childhood obesity is an emerging health issue in most developed countries, including Australia, where the proportion of children aged 2–17 years overweight or obese is approximately 22%.^{1–3} Other studies report similar patterns of increasing overweight and obesity in preschool-aged children.⁴ Increased susceptibility to type 2 diabetes, coronary heart disease, increased blood pressure and osteoarthritis are some of the health consequences of obesity in adulthood,⁵

and some are increasingly reported among obese children.^{6,7} Furthermore, research suggests that child obesity tracks into adulthood,⁸ signifying the potential for large financial and social costs in generations to come.

The increasing number of overweight and obese children is generally attributed to the prevalence of an 'obesogenic' environment, whereby modern lifestyles tend to foster an imbalance between energy intake and energy expenditure, resulting in excessive fat deposition.⁹ Amplified child energy intake is a result of increased consumption of energy-dense, high-fat foods and snacks.¹⁰ Evidence suggests that for the child, the most powerful influence over the formation of such dietary habits is the family and the family food environment.^{11,12} For example, parents influence the child's diet through nutrition knowledge, food availability and access, meal structure, food modelling and food socialisation practices.^{13,14} Through these practices parents shape their child's food preferences, fruit and vegetable consumption,¹⁴ and energy intake.¹⁵

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Another important area of influence is parenting styles, including family eating patterns, emotional feeding (feeding as a response to distress), and instrumental feeding (giving food as a reward).¹⁶ The focus of the current paper is on one aspect of child feeding style: control over children's eating (restriction, pressure or monitoring). Control over feeding has been shown to differ between cultures,¹⁷ by socioeconomic status (SES)¹⁸ and according to child gender.¹⁹ Some research suggests that higher control over feeding interferes with the child's ability to self-regulate energy intake,²⁰ while others have not found this relationship.²¹ In the research literature to date, the vast majority of studies dealing with child feeding and parental practices draw from small-scale, well-educated European- American samples.^{13–15,18–20} Given that eating and feeding practices are culturally formed, such research cannot necessarily be translated to an Australian context.

The aims of the current study were to:

- Examine the child feeding practices of Australian mothers of young children aged 2–6 years, with a focus on investigating maternal control over feeding
- Examine any gender differences in child feeding practices of mothers
- Determine the main predictors of maternal feeding practices

The hypothesis for the current study is that mothers of two- to six-year-old Australian children will exert more controlling child feeding practices when they have a high level of concern about their child's weight status and perceive their child's weight as problematic. It was also hypothesised that mothers would report more concern and controlling practices for daughters than for sons.

METHODS

Participants

The participants were 111 women, who were the mothers of two- to six-year-old children (57 boys and 54 girls). More than 100 participants were included in order to ensure a balance between genders for analyses. Mothers were chosen on the basis that they generally spend more time than fathers in direct interaction with their children across various situations, including mealtimes.²² The mothers were attendees at a learn-to-swim school located on the Central Coast of New South Wales (NSW). The swim school was chosen because: its customer base was from a mix of lower, middle and higher SES; its fees were the lowest of all swim schools in the region with a deliberate aim to attract low-income families; and its location was close to public transport and cheaper housing. Mothers were invited to complete a short questionnaire about 'family food practices'²³ while their children were involved in swimming lessons. Mothers were told to answer questions in relation to whichever child aged 2–6 years was present at the swim school on the day of the study. Only one mother from a total of 112 declined the invitation to complete the questionnaire due to time constraints, and this represented a 99.2% response rate.

Measures

The demographic questionnaire was used to collect data about maternal age, education, total family income, employment status, hours of work undertaken outside the home, ethnicity and details of family structure (number, ages of children). Mothers' education was assessed by self-report of the highest level of schooling completed. Response categories included: 'Finished primary school', 'Finished year 10', 'Finished year 12', 'Finished TAFE' and 'Finished university'. Given the association between maternal education and childhood diet, maternal education and total family income were used in the present study as the descriptor of SES similar to previous Australian research.²⁴ Low SES was classified as completing year 10 or less education and total family income below \$42 000; middle SES was \$42 000–104 000 and less than university education; and high SES was greater than \$104 000 and university education (Table 1).

Maternal and child heights and weights were measured in order to determine body mass index (BMI). Children were weighed and measured using a stadiometer in light, dry swimming costumes. Mothers were weighed and measured in light summer clothing. Overweight and obesity were assessed using the international BMI cut points defined by Cole *et al.*²⁵

The Child Feeding Questionnaire (CFQ)²³ is a validated tool for assessing one aspect of the family environment: parents' perceptions, beliefs, attitudes and practices regarding child feeding relevant to the development of obesity proneness in children. The CFQ consists of a total of seven factors: four regarding maternal perceptions and concerns about their child, and three relating to maternal practices.

Perceived responsibility

This factor consists of three questions relating to the level of responsibility that the mother feels in feeding her child. Item examples include: 'When your child is at home, how often are you responsible for feeding her?' and 'How often are you responsible for deciding what your child's portion sizes are?'

Four items measure perceived maternal weight through various stages of life, from childhood through to present. Item examples include: 'During your 20s were you' and 'At present are you.'

Three items measure maternal perception of the child's weight through various stages of childhood, from first year of life to preschool age. Item examples include: 'As a toddler was your child' and 'As a preschooler was your child.'

Four items measure maternal concerns about the child developing a weight problem, or that the child will have to diet to maintain a healthy weight. Item examples include: 'How concerned are you about your child eating too much when you are not around him/her?' and 'How concerned are you about your child becoming overweight?'

The restriction factor indicates maternal concern by measuring maternal attempts to control the child's eating by restricting access to foods, including the type and amount of

Table 1 Description of demographic details and BMI status among 111 mothers and their two- to six-year-old children

	% (n)	Mean (SD)
Maternal age (years)		
18–24	2.7 (3)	
25–29	7.21 (8)	
30–34	45.0 (50)	
Over 35	45.0 (50)	
Maternal education		
Finished primary school	2.7 (3)	
Finished year 10	34.2 (38)	
Finished year 12	18.6 (20)	
Finished TAFE	31.5 (35)	
Finished university	13.5 (15)	
Combined family income		
<\$12 000	1.8 (2)	
\$12 000–42 000	19.8 (22)	
\$42 100–104 000	62.2 (69)	
≥\$104 000	16.2 (18)	
Maternal ethnicity		
Anglo-Saxon/Caucasian	90.1 (100)	
Aboriginal/Torres Straight Islander	1.8 (2)	
Southern European	3.6 (4)	
Asian	2.7 (3)	
Other	1.8 (2)	
Number of children		
1	13.5 (15)	
2	53.2 (59)	
3	23.4 (26)	
4	9.9 (11)	
Gender of child		
Male	51.4 (57)	
Female	48.6 (54)	
Maternal BMI status		
Normal	64 (71)	
Overweight	17.1 (19)	
Obese	18.9 (21)	
Child BMI status		
Normal	78.4 (87)	
Overweight	15.3 (17)	
Obese	6.3 (7)	
Child age (years)		4.42 (1.35)
Maternal BMI		24.8 (5.2)
Child BMI		16.2 (3.1)

N = 111 mothers, N = 111 children.

BMI = body mass index; TAFE = Technical and Further Education.

food. Three sets of restriction items are clustered to measure: (i) mothers' use of food as a reward; (ii) mothers' monitoring of children's food intake; and (iii) mothers' restriction of their children's access to certain foods. Item examples include: 'I have to be sure that my child does not eat too many high-fat foods', and 'If I did not guide or regulate my child's eating, he/she would eat too much of his/her favourite foods'.

The factor of pressure to eat consists of four items measuring the extent to which mothers report pressuring the

child to eat more food. Item examples include: 'If my child says "I'm not hungry," I try to get him/her to eat anyway', and 'My child should eat all the food on his/her plate.'

The monitoring factor assesses the extent to which the mother keeps track of the child's intake of sweets, snack foods and high-fat foods. Item examples include: 'How much do you keep track of the high-fat foods that your child eats?' and 'How much do you keep track of the snack food (potato chips, Doritos, biscuits)?'

Statistical analysis

Data were analysed using the Statistical Package for the Social Sciences (version 10.0, 2000, SPSS Inc., Chicago, IL, USA). The data satisfied tests of normality. The relationships between maternal perceptions, beliefs, attitudes, practices and CFQ predictor values were first examined using bivariate Pearson product-moment correlations. Gender differences between all CFQ factor means were tested using independent-sample *t*-tests. Multiple regression analysis was then undertaken to examine all predictors of maternal child feeding practices in the CFQ (restriction, pressure and monitoring).

Formal approval was granted from the University of Sydney Human Research Ethics Committee.

RESULTS

Maternal and child characteristics

Table 1 lists all descriptive statistics for the full sample of mothers and children. The majority of mothers were aged 30 years and above (90.1%), with two or more children (86.6%), of predominantly Anglo-Saxon ethnicity (89.3%), and of lower/middle SES based on maternal education (only 13.4% reported tertiary-level education). A total of 35.8% of mothers were overweight or obese. Children were aged 2–6 years, with a mean age of 4.4 (SD = 1.4) years. A total of 15.3% of children were overweight and 6.3% were obese.

Relationship among maternal and child variables

Table 2 contains descriptive statistics for mean factor scores and internal consistencies (Cronbach's alpha) for each of the seven factors of the CFQ. Internal consistencies ranged from 0.70 to 0.92, suggesting that all internal consistencies were within acceptable levels. The results here indicate high reported levels of perceived responsibility in feeding, restrictive feeding practices and monitoring of child food intake, suggesting a high level of maternal involvement and control of child feeding. Conversely, mean concern for child weight, perceived weight and pressure to eat approached the lower end of the range, indicating a relatively low level of concern about the child's weight.

Child gender and maternal feeding style

Independent *t*-tests were conducted to examine any gender-based differences in maternal attitudes and feeding practices.

Table 2 Mean scores, SD and internal consistency scores for each factor of the Child Feeding Questionnaire among 111 mothers of two- to six-year-old children

Factor	Mean \pm SD	Range	Internal consistency
Perceived responsibility	4.55 \pm 0.57	2–5	0.88
Perceived maternal weight	3.09 \pm 0.38	2–4	0.70
Perceived child weight	2.97 \pm 0.25	2–4	0.75
Concern	1.80 \pm 1.03	1–5	0.83
Restriction	3.58 \pm 0.88	1–5	0.79
Pressure to eat	2.73 \pm 1.02	1–5	0.68
Monitoring	4.32 \pm 0.65	2–5	0.83

Table 3 Mean scores and SD for each CFQ factor based on child gender

Factor	Sons (N = 57) Mean \pm SD	Daughters (N = 54) Mean \pm SD
Perceived responsibility	4.62 \pm 0.47	4.48 \pm 0.66
Perceived maternal weight	3.01 \pm 0.35	3.11 \pm 0.41
Perceived child weight	2.95 \pm 0.24	2.98 \pm 0.27
Concern for child weight	1.64 \pm 1.03	1.98 \pm 1.02
Restriction	3.47 \pm 0.84	3.72 \pm 0.92
Pressure to eat	2.64 \pm 0.97	2.80 \pm 1.05
Monitoring food	4.37 \pm 0.61	4.30 \pm 0.67

CFQ = Child Feeding Questionnaire.

There were no statistically significant gender differences in age ($t = 0.52$, $P > 0.05$). Mean scores for each factor based on child gender can be seen in Table 3. There was no statistically significant effect of concern with child weight, but the direction of scores suggests that mothers may have a greater level of concern for their daughters than for sons. Separate analysis of individual CFQ items suggested that mothers may be more concerned with their daughters becoming overweight (mean (SD) 2.24 (1.47) vs sons 1.74 (1.28), $t = -1.94$, df , 109, $P = 0.056$), and are more likely to keep food out of reach of their daughters compared with their sons (mean (SD) 4.37 (1.09) vs sons 3.54 (1.66), $t = -3.12$, df , 109, $P = 0.002$). None of the other factors approached statistical significance, which was due to low statistical power.

Bivariate correlations between sample characteristics, maternal child feeding attitudes, beliefs and practices are presented in Table 4. Mothers who reported high concern with their child's weight status currently and in the future were significantly more likely to report controlling feeding practices, specifically in the domain of food restriction ($r = 0.28$, $P < 0.01$). Mothers who reported high levels of food restriction also reported monitoring food intake, and statistically significant correlations were found ($r = 0.33$, $P < 0.01$). There were no significant correlations between perceived child weight and controlling practices, counter to the hypotheses that perceived child weight would predict levels of maternal control over feeding. Older mothers reported having older children ($r = 0.22$, $P < 0.05$) and more children ($r = 0.24$, $P < 0.05$); yet a weak negative relation-

ship was noted between maternal age and use of food restriction approaching a marginally significant level ($r = -0.19$, $P < 0.10$), which may suggest that maternal control decreased with child age. Less-educated mothers were more likely to report using pressure to eat in feeding their children ($r = -0.19$, $P < 0.05$), and to have more children ($r = -0.24$, $P < 0.05$).

Relationship between maternal perceived weight and actual weight status for mothers and their children

The mothers were clearly able to accurately assess their own weight status, with 39 out of 40 overweight or obese mothers correctly identifying themselves as such, but only 4.1% of mothers correctly assessed the overweight or obese status of their child. This result was related to the degree of overweight or obesity among the children, as mothers were more accurate in identifying child obesity than child overweight.

The results of correlational analyses show that correlations between perceived child weight and actual child BMI were significant ($r = 0.20$, $P < 0.05$), suggesting that mothers were accurate to some degree in assessing the weight status of their child, particularly as the child's BMI increased. The relationship between perceived maternal weight and actual maternal BMI was statistically significant at a higher level ($r = 0.71$, $P < 0.01$), indicating the accuracy of the mother's self-assessment of overweight or obesity.

Table 4 Relationships among maternal and child characteristics among 111 mothers of two- to six-year-old children

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Perceived responsibility	-0.17													
2. Perceived maternal weight	-0.11	0.18												
3. Perceived child weight	0.01	0.12	0.18											
4. Concern for child weight	0.02	-0.04	0.03	0.28**										
5. Maternal restriction	-0.09	-0.08	-0.12	0.04	0.17									
6. Maternal pressure	0.14	0.06	-0.04	0.17	0.33**	-0.08								
7. Maternal monitoring	-0.07	0.71**	0.13	0.02	-0.10	-0.07	-0.03							
8. Maternal BMI	-0.05	-0.12	0.20*	0.12	0.03	-0.07	0.01	-0.01						
9. Child BMI	-0.03	-0.01	-0.10	-0.01	-0.03	-0.19*	0.05	-0.10	-0.01					
10. Maternal education	-0.08	0.11	0.01	-0.10	-0.19	-0.13	0.03	0.06	-0.07	0.06				
11. Maternal age	0.09	-0.08	0.02	-0.11	-0.17	0.05	0.24*	0.30**	-0.19*	-0.24*	0.24*			
12. Number of children	0.08	0.05	-0.02	0.05	-0.08	0.10	0.01	0.08	-0.17	-0.06	0.22*	0.31**		
13. Child age														

* $P < 0.05$, ** $P < 0.01$.
BMI = body mass index.

Table 5 demonstrates the differences between child weight status and maternal perceptions, beliefs and feeding practices. Mothers of overweight children reported a higher level of perceived child weight than did mothers of children who were of normal weight ($F_{1,102} = 7.313$, $P < 0.05$). While there was a trend for mothers of obese children to report higher levels of all factors (except for perceived responsibility) than mothers of normal- or overweight children, there was insufficient power for any of these to reach statistical significance.

Models of maternal control

In order to test the relationship between maternal attitudes, concerns, SES and level of controlling practices, a multiple linear regression analysis was conducted separately for monitoring, pressure and restriction. The 11-factor model is illustrated in Figure 1.

As presented in Figure 1, the 11-factor model predicted 25.4% of variance ($F_{11,97} = 3.004$, $P < 0.05$) for restriction. Monitoring, concern and pressure to eat were the significant predictors of reported food restriction ($P < 0.05$), providing partial support for the hypothesis that maternal concern for child weight would predict maternal restriction over child feeding. The sole significant predictors for monitoring and pressure was restriction ($P < 0.05$). Based on these results, further regression analysis examined the amount of variance in restriction predicted by these three factors. After removal of all statistically nonsignificant factors, monitoring ($r = 0.31$, $P < 0.05$), concern ($r = 0.24$, $P < 0.05$) and pressure ($r = 0.21$, $P < 0.05$) still explained 20.7% of variance in reported restriction ($F_{3,108} = 9.391$, $P < 0.001$).

DISCUSSION

The current study aimed to explore the use of controlling feeding practices by Australian mothers from middle to low SES when feeding their young preschool-aged children between two and six years. It was hypothesised that control (restriction, pressure and monitoring) would increase when mothers reported concern about their children's weight and perceived them as over- or underweight. It was also hypothesised that mothers would report more concern about their daughters' weight status currently and in the future.

An unexpected finding in studying parental control over feeding was the negative correlation between maternal SES and pressure to eat, a practice generally associated with parents' attempts to encourage child consumption of more food and the practice of making children finish all of the food on their plate.²³ This is the first known study of young preschool-aged Australian children to demonstrate a relationship between pressure to eat and maternal education, and in light of previous research suggesting negative consequences of such practices,^{26,27} may partially explain previous associations between higher rates of overweight and obesity among Australian children of lower SES.^{2,28} Similarly, European-based research found that lower-SES parents only bought foods that they were confident their child would eat.¹⁸ In other words, lower-SES mothers may attempt to

Table 5 A comparison of maternal perceptions, beliefs and feeding practices according to the factor of child weight status (mean \pm SD) among 111 mothers of two- to six-year-old children

Child weight status	n	Perceived responsibility	Perceived child weight	Concern	Restriction	Pressure	Monitoring
Normal	87	4.58 \pm 0.50	2.93 \pm 0.22	1.77 \pm 1.05	3.57 \pm 0.88	2.74 \pm 0.99	4.32 \pm 0.67
Overweight	17	4.35 \pm 0.88	3.13 \pm 0.36	1.75 \pm 1.02	3.58 \pm 1.06	2.96 \pm 1.22	4.37 \pm 0.62
Obese	7	4.67 \pm 0.47	3.42 \pm 0.49	2.43 \pm 0.76	3.70 \pm 0.28	2.14 \pm 0.94	4.29 \pm 0.49

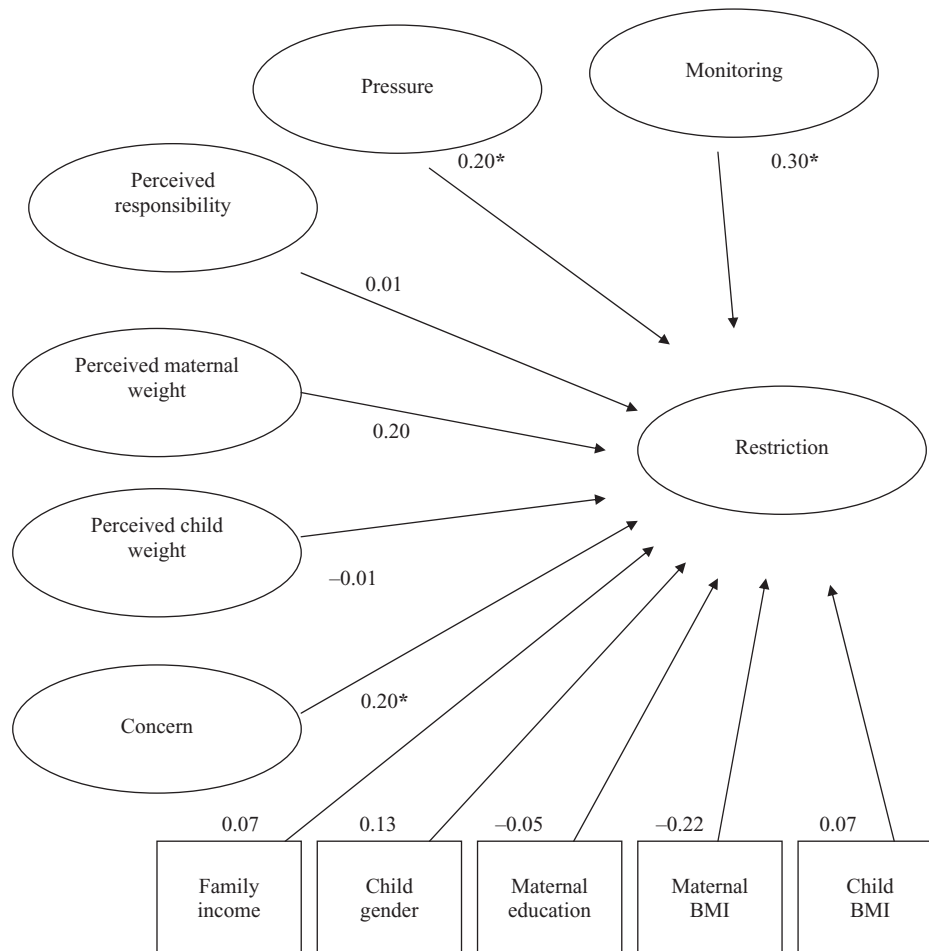


Figure 1 Predictors of maternal food restriction among 111 mothers of children aged 2–6 years. * $P < 0.05$. BMI = body mass index.

pressure their children to eat certain foods and finish all of the food given to them, rather than see that food wasted. It was hypothesised in the current study that maternal control (pressure, monitoring and restriction) would be predicted by perceptions of, and concerns about, child weight. In partial support for the hypothesis, the final model used in multiple linear regression analysis revealed that restriction was predicted by concern, pressure to eat and monitoring. This indicates that mothers of two- to six-year-old children who report restricting food also monitor food intake and use pressure to eat, and although direction of causation is

unknown, the current findings suggest that mothers appear to restrict access to foods when concerned about their child's weight.

Previous research suggests that parents commonly identify 'bad' foods and restrict access to these foods in an effort to lower consumption.¹⁹ Despite these good intentions, research suggests that restricting access to certain foods on this basis may have unintended consequences. Casey and Rozin found that restricting access to foods high in fat and sugar does not decrease the child's liking for the restricted food,²⁹ a finding confirmed by Fisher and Birch,^{26,27} who

found that food restriction increased the likelihood of the child's selection and intake of the food when unsupervised. Given that previous research has not found an association between child feeding strategy and child weight status,^{30,31} the current findings reinforce the idea that that parental control over child food intake is a complex, multifactorial phenomenon.

The current study reports slightly lower proportions of child obesity and overweight than a previous Australian study involving children of similar age;²⁴ yet high levels of maternal control over child feeding were reported.

These results are in agreement with Mrdjenovic and Levitsky's²¹ assertion that a certain amount of control over powerful environmental influences, such as meal size serving, availability of snacks and meal frequency, constitutes an effective method of ensuring optimal child energy intake. Hence, control over food may be both a negative and positive influence on children's food intake.

An interesting finding in support of our original hypothesis was that mothers reported more concern about their daughters' weight status compared with their sons. Given that there was no discernable difference between the boys' and girls' BMI status, high maternal concern about their daughter's weight may be a product of Western society's well-established values of thinness as a symbol of power, wealth, success and feminine beauty.¹⁷ While previous research suggests that parents are more likely to report concern about their daughters' weight²⁴ and are more likely to restrict the diets of their daughters,¹⁹ the present study is the first known incidence of reported concern among such a young Australian sample. The young nature of the sample may also explain the finding counter to the hypothesis that, despite higher levels of concern, mothers did not report higher levels of control in child feeding based on gender. In addition, a limitation of the current study is that the mothers were only asked to report their perceptions of one of their children, hence limiting the measurement of their perceptions of both their daughters and their sons. Further research should therefore include the mothers of sons and daughters in order to further explore these interesting trends in the gender-based differences in mothers' feeding practices.

A most interesting finding of the present study relates to the relationship between maternal perceptions of child weight and control over feeding. Previous research has demonstrated that parents are unable to accurately assess the weight status of their child.³² In 2005, Carnell *et al.* confirmed a notable lack of awareness in the mothers of overweight three- to five-year-old children.³² These findings were hypothesised to reflect a general shift in what parents perceive as overweight, perhaps due to the increasing weight status of the population, or that parents may hold distorted perceptions unique to their child while still being able to recognise overweight in other children. Yet the results of the current study suggest otherwise. Despite the lack of statistically significant findings, the maternal CFQ scores in the current study clearly demonstrated that mothers of obese children reported the highest perceived child weight, concern for child weight, food restriction and lower levels of

pressure to eat. Rather than parents being unable to accurately assess weight status of their children, it appears that it is mainly the somewhat contentious category of overweight that parents are unable to assess. This is an interesting finding, because public health efforts to heighten awareness of, and prevent, child obesity tend to include overweight and obesity in the same category. As the current findings reveal, this may be a confusing and counterproductive way of presenting the facts to parents and the general public, particularly because mothers may be approaching the issue from a very different viewpoint. Further research should clarify this new finding to determine whether mothers perceive child overweight and obesity differently, and fathers should also be included in future studies.

An interesting finding of the present study was that parents reported a high level of controlling feeding practices in the domain of perceived responsibility, food restriction, pressure to eat and monitoring when compared with the original American research by Birch *et al.*²³ While no previous Australian studies exploring the relationship between SES and maternal control over feeding among young preschool-aged children were found, and thus none using the Birch and colleagues' measurement tool, these findings contrast with previous international research in which mothers of middle to lower SES report lower levels of control and higher child adiposity in comparison with higher-educated parents.¹⁸ Thus, it may be that complex socio-cultural practices contribute to the amount of control parents use in feeding their children.

The results of the present study should be interpreted with caution. The moderate sample size consisted of predominantly Anglo-Saxon mothers from a small area of NSW, Australia. Thus, results may not be representative of the region or the entire population. A self-report measure was utilised, using a cross-sectional study design preventing causation to be determined. Strengths of the study include use of a validated instrument, measured height and weight, and a low-SES sample. Future research may further explore the relationship between child gender and control over feeding, the relationship between maternal education and pressure to eat, and maternal perceptions of child weight.

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