Research report

Pressure to eat and restriction are associated with child eating behaviours and maternal concern about child weight, but not child body mass index, in 2- to 4-year-old children

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Introduction

Parents play a key role in their children's diets. In the early years in particular, parents tend to shape the development of their children's eating habits by determining which foods are made available for their families. Additionally, feeding strategies that parents use to control the quantity and content of their children's food intake may influence children's eating behaviour (Ventura & Birch, 2008). Parental feeding practices include directive and non-directive strategies. One directive feeding technique is pressure to eat, that is, pushing children to eat more food, or to increase their intake of healthy foods. Another directive approach is restriction, which involves an attempt to control children's diet by restricting their access to unhealthy foods. Non-directive feeding practices include monitoring the children's intake of unhealthy foods, and modelling healthy eating (Rhee, 2008; Ventura & Birch, 2008).

Costanzo and Woody (1985) proposed that parents are more likely to use higher levels of control over child feeding when they are concerned about their child's weight, but that excessive control may disrupt a child's ability to self-regulate their eating. Therefore, well-intended strategies to modify children's eating habits may actually exacerbate problematic eating behaviour. For example, Pressuring children to eat more has been observed to reduce food consumption and produce more negativity about the food they were being pressured to eat (Galloway, Fiorito, Francis, & Birch, 2006). Restriction of snack foods has been shown to lead to increased preference for and intake of the restricted food once the prohibition was lifted (Fisher & Birch, 1999; Jansen, Mulkens, & Jansen, 2007). However, this has not been observed for modelling of healthy eating, which has been found to increase a child's intake of the foods being modelled (Addessi, Galloway, Visalberghi, & Birch, 2005; Harper & Sanders, 1975).

Associations between parental feeding practices and child weight status have been examined extensively over the past decade. Cross-sectional studies have found that pressure to eat was associated with lower child weight status (Birch et al., 2001; Brann & Skinner, 2005; Carnell & Wardle, 2007; Powers, Chamberlin, van Schaick, Sherman, & Whitaker, 2006), while restriction was related to higher child weight status in some studies (Birch et al., 2001; Francis, Hofer, & Birch, 2001) but not others (Carnell & Wardle, 2007).
It is unclear whether feeding practices result in lower or higher child weight status, whether feeding practices are reactive to the child’s weight status, or whether another factor underpins these relationships (Rhee, 2008; Ventura & Birch, 2008).

One study suggests pressure to eat is used in response to lighter child weight (Keller, Pietrobelli, Johnson, & Faith, 2006). This examination of within-family differences found that parents more frequently used pressure to eat with their lighter than heavier children and there was a trend for the use of restriction with heavier rather than lighter siblings. However, evidence suggests that parents are not very accurate at identifying their child’s weight status (Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Gray et al., 2007; May et al., 2007). Thus, it is possible that there are other factors that might explain the association between child weight status and parental feeding practices. Parental concern about child’s weight is one possible factor.

May et al. (2007) found that parents who were highly concerned about their child becoming overweight were more likely to use restriction and less likely to use pressure to eat than parents with lower levels of concern, but there was no direct association between these feeding practices and child weight status. Crouch, O’Dea and Battisti (2007) also found that restriction was associated with more concern about child overweight, but not actual weight. Neither study included a measure of concern about child underweight. These findings support Costanzo and Woody’s (1985) suggestion that parents are more likely to exert control over children’s eating if they are concerned about the child’s present or future weight, and it appears that this may occur regardless of the child’s actual weight.

Parents’ feeding practices may also be elicited by problematic child eating behaviour. This notion is partially supported by the results of a sibling study that found that parents used more pressure to eat with siblings who were fussy eaters than those who were less fussy, and more restriction with siblings who desired to drink more and were fussy eaters (Farrow, Galloway, & Fraser, 2009). It is possible that parents are concerned about how eating behaviours could influence a child’s future weight, and use feeding practices to control the child’s weight status preemptively. To our knowledge there is no existing research that examines associations between parental feeding practices and eating behaviours in relation to concern about child weight.

In contrast to the findings for pressure to eat and restriction, sibling studies have found that parents did not differentially monitor their child’s intake of unhealthy foods according to the weight status (Keller et al., 2006) or eating behaviours (Farrow et al., 2009) of the child. In addition, a number of studies have found no association between monitoring and child weight status (Birch et al., 2007; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). Further, monitoring has not been significantly associated with parental concern about child weight (Birch et al., 2001; Corsini, Danthir, Kettler, & Wilsona, 2008; Crouch et al., 2007). Modelling of healthy eating was also not associated with child weight status (Kröller & Warschburger, 2008), and to our knowledge this practice has not been studied in conjunction with parental concern about child weight.

Understanding relationships between parental feeding practices, parental concern about child weight, child eating behaviours and child BMI is important in informing the development of health promotion messages. The aim of this cross-sectional study was to expand previous research examining relationships between directive and non-directive feeding practices, concern about child weight, child BMI and child eating behaviour. We focused on the child eating behaviours food fussiness and food responsiveness, which have been associated with lower and higher child BMI, respectively (Viana, Sinde, & Saxton, 2008; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009).

Our first aim was to explore associations between maternal feeding practices and concern about child weight, extending previous research by including measures of both directive (pressure to eat and restriction) and non-directive (monitoring of the child’s intake of unhealthy foods and modelling healthy eating) feeding practices, and by incorporating a measure of concern about child underweight as well as overweight. We hypothesised that pressure to eat would be associated with greater concern about the child being underweight, and restriction would be positively related to concern about child overweight. We also hypothesised that monitoring and modelling feeding practices would not be associated with maternal concern about under- or overweight.

Our second aim was to test whether maternal concern about child weight mediated relationships between maternal feeding practices and child eating behaviours and/or child BMI. We hypothesised that parents who reported using more pressure to eat would also report that their children were lighter and were fussier eaters. We expected that this relationship would be mediated by maternal concern about the child being or becoming underweight. We also hypothesised that parents who reported using more restriction would report that their children were heavier and more food responsive, and that this relationship would be mediated by maternal concern about the child being or becoming overweight.

### Method

#### Participants

Participants were 183 mothers of 2- to 4 year-old children, recruited via advertisements in community notices sections of local newspapers. In addition, playgroup co-ordinators were invited to distribute questionnaire packs to mothers in their groups. Participants completed the paper questionnaires at home and posted them to the researchers along with signed consent forms. Mothers ranged in age from 21 to 48 years (mean = 34.9 years, SD = 5.2), and 86% were married or in a de facto relationship. More than half the participants were tertiary educated (56%) and a further 25% had completed high school or some form of diploma or apprenticeship. This represents a slightly higher level of education in our sample compared with national rates for age-matched women (Australian Bureau of Statistics, 2009a). The majority of women were born in Australia (90%) and a further 5% were born in Western Europe. A high proportion of mothers were engaged in full-time home duties (42%), another 36% were employed part-time and 4% were in full-time employment. BMI was calculated from the self-reported height and weight of the mothers, 49% of whom were considered overweight or obese (BMI >25). This is comparable with other Australian data for women in this age group (Australian Bureau of Statistics, 2009b).

The mean age of children was 3.3 years (SD = .84), and 52% were female. Height and weight data were provided by mothers for 77% of the children, and of that group, 8.5% were considered underweight (<5th percentile) and 26% overweight or obese (>85th percentile), using age and gender adjusted BMI z-scores (BMIz) from the Centre for Disease Control and Prevention (CDC) 2000 growth charts (CDC, 2000). This represents a slightly higher proportion of overweight in our sample when compared with age-matched peers in the Australian population (Commonwealth Scientific Industrial Research Organisation, 2008).

Independent sample t-tests were conducted comparing the mean scale scores for male and female children. There were no significant differences between boys and girls on any scale, so they
were combined for all subsequent analyses. In addition, no significant differences were observed in scale scores for mothers who provided height and weight data for their children compared with those who did not. The whole sample \((N = 183)\) was therefore used in all analyses except those requiring the child’s BMI\(z\) \((n = 141)\).

Participants received a $10 supermarket gift voucher for their participation. This study was approved by the Human Research Ethics Committee at La Trobe University.

Measures

The questionnaire included a demographic questionnaire about the mother and her child, including age, gender, weight and height. Additionally, mothers answered questions regarding their feeding practices, child eating behaviour, and concern about child weight. The items from each subscale were delivered in the same order as the original published version.

Maternal concern about her child’s weight

Maternal concern that her child was or would become overweight was measured using the concern about child weight subscale \((3\) items, e.g. “How concerned are you about your child becoming overweight?”, \(\alpha = .83\)) of the Child Feeding Questionnaire \((CFQ)\) \((Birch et al., 2001)\). Maternal concern that her child was or was becoming underweight was measured using the concern about child underweight subscale \((2\) items, e.g. “I am worried that my son/daughter is underweight right now”, \(\alpha = .80\)) from the Preschooler Feeding Questionnaire \((Baughcum et al., 2001)\).

Maternal feeding practices

Three parental feeding subscales were used from the CFQ \((Birch et al., 2001)\): pressure to eat \((4\) items, e.g. “If my child says ‘I’m not hungry’, I try to get him/her to eat anyway,”, \(\alpha = .76\)); restriction \((6\) items, e.g. “I intentionally keep some foods out of my child’s reach,”, \(\alpha = .79\)); and monitoring \((3\) items, e.g. “How much do you keep track of the high-fat foods that your child eats?”, \(\alpha = .88\)). Modelling of healthy eating was measured using 3 items written for the purposes of this study \((\alpha = .71\): “I try to eat only healthy foods in front of my child”; “My child sees me eating fast food” \((\text{reversed item})\), and; “My child sees me eating healthy snacks (e.g. fruit, yoghurt, nuts, toast).”

Child eating behaviour

Two subscales were used from the Child Eating Behaviour Questionnaire \((Wardle, Guthrie, Sanderson, & Rapoport, 2001)\). Food responsiveness indicates the extent to which children will eat in response to food, regardless of hunger \((5\) items, e.g. “Even if my child is full up she finds room to eat his/her favourite food,” \(\alpha = .78\)). Food fussiness measures how readily children accept new foods and enjoy dietary variety \((3\) items, e.g. “My child refuses new foods at first,” \(\alpha = .83\)).

To test the suitability of the existing measures for our sample, a factor analysis was conducted for each individual subscale. With the exception of the restriction and the food fussiness subscales, the items for each subscale loaded onto a single factor as expected. However, for the 8-item restriction scale there were two distinct factors. Four of the 8 items loaded exclusively on factor one, 2 items loaded on both factors, and a further two loaded only on factor two. These latter 2 items were both regarding the use of food as a reward for good behaviour, and the theoretical and statistical basis of their inclusion in the subscale has been questioned elsewhere \((Anderson, Hughes, Fisher, & Nicklas, 2005; Corsini et al., 2008)\). When these 2 items were removed, the remaining items loaded onto one factor explaining 49% of the variance, so the resulting 6-item version of the scale was used. For child food fussiness, the 6 original items loaded onto two factors, with 3 items on each factor. One factor contained items referring to the child’s food fussiness and refusal, while the second factor consisted of items regarding the child’s interest in new foods and variety. This finding suggested a distinction between the two variables, so we used a 3-item version of the fussiness subscale for our final analyses, retaining only the items regarding fussiness and refusal.

Unless otherwise specified, the items were measured on a 5-point Likert scale, and the subscale score was calculated using the mean of all the items in the subscale. A higher scale score represents greater concern, more frequent use of a feeding strategy, or higher levels of engaging in a particular eating style. Mean scores for each subscale are shown in Table 1.

Statistical analyses

Descriptive statistics were established for all the variables. Monitoring showed negative skewness and both concern for underweight and concern for overweight were positively skewed. Skewness for all three variables was corrected using logarithmic transformations. Pearson’s correlations were used to examine associations between maternal feeding practices, mothers’ concern for the child’s weight, child BMI\(z\) and child eating behaviour.

To demonstrate that a variable functions as a mediator, there must be a significant relationship between \(\text{a})\) the predictor variables \((e.g. \text{child }\text{BMI}z \text{and }\text{child eating behaviour})\) and the potential mediators \((\text{concern about child weight}), \text{b}) \text{the potential mediator and the dependent variables (maternal feeding practices)}, \text{and (c}) \text{the predictor variables and the dependent variables} \((\text{Fig. 1})\). If the relationship at \((\text{c})\) is reduced after controlling for relationships \((\text{a} \text{and }\text{b})\), then there is evidence for a mediating effect \((\text{Baron & Kenny, 1986})\). For the present study, if the correlation analysis showed that relationships \((\text{a}), \text{b} \text{and }\text{c}) \text{were significant} \((p < .05)\), then the variables were entered into a hierarchical multiple regression to test a mediation relationship. Two separate regressions were conducted, with pressure to eat and restriction as outcome variables. At step 1, we entered maternal BMI and maternal education as potentially confounding variables for feeding practices. Predictor variables \((\text{child }\text{BMI}z \text{and/or child eating behaviour})\) were entered into the regression at step 2, and mediator variables \((\text{concern about child under- or overweight})\) were added at step 3. The mediation hypothesis would be supported if beta scores for the predictor variables were reduced when mediator variables were entered at step 3. For this cross-
sectional study, we use the word “predictor” as a statistical term and not as an indication of causality.

Results

The results of the analyses examining correlations between maternal feeding practices, mother’s concern for the child’s weight status, child BMIz and child eating behaviours are presented in Table 2. Consistent with our hypotheses, pressure to eat was significantly positively associated with maternal concern about child underweight, and restriction was significantly positively associated with maternal concern about child overweight. Although not hypothesised, modelling eating healthy food was significantly negatively associated with concern about underweight and neither modelling nor monitoring was significantly associated with maternal concern about overweight. Table 2. Consistent with our hypotheses, pressure to eat was significantly negatively associated with concern about underweight, and restriction was significantly positively associated with maternal concern about overweight.

The correlation analyses showed that the criteria were met for a mediation analyses in relation to maternal pressure to eat (Baron & Kenny, 1986). Table 2 shows that higher maternal concern about child underweight was associated with lower child BMIz, higher child fussiness (path a) and more frequent use of pressure to eat (path b). In turn, pressure to eat was associated with lower child BMIz and higher child fussiness (path c). A hierarchical regression analyses was then conducted, using the reduced sample consisting of mothers for whom child BMIz data was available (n = 141). At the first step of the regression analysis, we entered maternal BMI and education as potentially confounding variables for pressure to eat. At step 2 we entered child BMIz and fussiness, and after accounting for the other variables in the model, child BMIz was not a significant independent predictor of maternal pressure to eat (β = −.14, p > .05). This variable no longer met the criteria as a predictor variable for a mediation analysis according to Baron and Kenny (1986), so we removed it from the model for the mediation analysis. The mediation analysis was conducted first using the reduced sample containing child BMIz data, and then repeated with the full sample (N = 183). The results were consistent across the two analyses; the data using the full sample are presented in Table 3. After accounting for maternal BMI and education, child food fussiness was a significant independent positive predictor of pressure to eat at step 2 (βchange = .07, p < .05). At step 3, we entered maternal concern about child underweight to establish whether this variable mediated the relationship between pressure to eat and fussiness. Concern about underweight significantly added to the variance (βchange = .15, p < .001). The beta value for fussiness was reduced but remained significant, indicating a partial mediation. Concern about child underweight was the strongest independent predictor of pressure to eat, uniquely explaining 15% of the variance. Child fussiness accounted for 4% of the variance, and maternal education was a significant negative predictor, explaining an additional 3% of the variance. A mediation analysis was then conducted for the feeding practice of restriction. As shown in Table 2, maternal concern about child overweight was positively associated with the mother’s reports of higher child food responsiveness (path a) and higher levels of restriction (path b), and restriction was also positively associated with concern about child overweight (path c), thus meeting the criteria for a mediation analysis (Baron & Kenny, 1986). Contrary to our hypothesis, child BMIz was not significantly association with restriction (Table 2), and so this variable was excluded from the mediation analysis. The results of the mediation analysis showed that child food responsiveness was a significant positive predictor of maternal restriction at step 2, after controlling for maternal BMI and education (βchange = .10, p < .001). When

<table>
<thead>
<tr>
<th>Maternal variables</th>
<th>Monitoring</th>
<th>Modelling</th>
<th>Concern underweight</th>
<th>Concern overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>.22*</td>
<td>.19**</td>
<td>.42*</td>
<td>.08</td>
</tr>
<tr>
<td>Restriction</td>
<td>.08</td>
<td>.01</td>
<td>.13</td>
<td>.24</td>
</tr>
<tr>
<td>Modelling</td>
<td>.09</td>
<td>.15</td>
<td>.07</td>
<td>.06</td>
</tr>
<tr>
<td>Concern about underweight</td>
<td>.18*</td>
<td>.05</td>
<td>.03</td>
<td>-.14***</td>
</tr>
<tr>
<td>Concern about overweight</td>
<td>-.03</td>
<td></td>
<td></td>
<td>-.34***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child variables</th>
<th>BMI z-score</th>
<th>Fussiness</th>
<th>Food responsiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fussiness</td>
<td>.06</td>
<td>.08</td>
<td>.03</td>
</tr>
</tbody>
</table>

* Transformed variables.

p < .05.

p ≤ .01.

Fig. 1. Baron and Kenny’s (1986) criteria for a mediation analysis. Simple associations at paths A, B and C must be significant in order to conduct mediation analyses for pressure to eat and restriction.
Table 3
Hierarchical multiple regression predicting maternal pressure to eat and restriction.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Dependent variables</th>
<th>Pressure to eat</th>
<th>Restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Sig.</td>
<td>Semipartial</td>
</tr>
<tr>
<td>Step 2&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal BMI</td>
<td>.07</td>
<td>.358</td>
<td>.07</td>
</tr>
<tr>
<td>Maternal education</td>
<td>-.14</td>
<td>.079</td>
<td>-.14</td>
</tr>
<tr>
<td>Child food fussiness</td>
<td>.27</td>
<td>.001</td>
<td>.27</td>
</tr>
<tr>
<td>Child food responsiveness</td>
<td>.39</td>
<td>&lt;.001</td>
<td>.38</td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal BMI</td>
<td>.04</td>
<td>.614</td>
<td>-.03</td>
</tr>
<tr>
<td>Maternal education</td>
<td>-.16</td>
<td>.023</td>
<td>-.16</td>
</tr>
<tr>
<td>Child food fussiness</td>
<td>.20</td>
<td>.006</td>
<td>.20</td>
</tr>
<tr>
<td>Child food responsiveness</td>
<td>.39</td>
<td>&lt;.001</td>
<td>.38</td>
</tr>
<tr>
<td>Concern about underweight&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.39</td>
<td>&lt;.001</td>
<td>.38</td>
</tr>
<tr>
<td>Concern about overweight&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.18</td>
<td>.025</td>
<td>.17</td>
</tr>
</tbody>
</table>

<sup>a</sup> After controlling for maternal BMI and education at step 1.
<sup>b</sup> Transformed variables.

maternal concern about overweight was entered into the model at step 3 ($r^2_{change} = .03, p < .05$), the beta value for food responsiveness reduced slightly but the variable remained a significant predictor, explaining 7% of the variance for restriction. Concern about overweight was also a significant predictor, explaining an additional 2% of the variance for restriction. Maternal concern about child weight partially mediated the relationship between child food responsiveness and maternal use of restriction.

As anticipated, monitoring and modelling were not associated with any of the child weight or eating variables, and thus did not meet the criteria for a mediation analysis. Based on the unexpected finding that modelling of healthy eating was significantly negatively correlated with concern for child underweight, we conducted a post hoc analysis to test whether this relationship could be explained by pressure to eat. When entered into a regression together, the combined model of modelling and pressure to eat explained a significant amount of the variance for concern about child underweight ($r^2 = .19, p < .001$), and pressure to eat was a significant independent predictor ($\beta = .40, p < .001$), but modelling of healthy eating was no longer significantly associated with concern about child underweight ($\beta = -.10, p > .05$).

Discussion

This aim of this study was to examine relationships between maternal concern about child under- and overweight, the use of directive (pressure to eat and restriction) and non-directive (monitoring and modelling of healthy eating) feeding practices, and child eating behaviours (fussiness and food responsiveness). As hypothesised, we found that mothers who reported higher levels of concern about child underweight also tended to report more frequent use of pressure to eat, higher levels of child food fussiness and lower child BMiz. The child’s reported food fussiness, but not child BMiz, was a significant independent positive predictor of maternal use of pressure to eat, and this relationship was partially mediated by the mother’s concern about her child being or becoming underweight. Mothers with higher levels of concern about child overweight reported more frequent use of restriction, and greater child food responsiveness, but not higher child BMiz. Child food responsiveness, but not child BMiz, was a significant positive predictor for maternal use of restriction, and as expected this relationship was partially mediated by the mother’s concern about the child being or becoming overweight. The hypothesis that there would be no association between non-directive feeding practices and maternal concern about child weight was supported. Monitoring and modelling were also not associated with child BMiz, food fussiness or food responsiveness.

The finding that pressure to eat and restriction were associated with maternal concern about child weight is consistent with prior research (Crouch et al., 2007; May et al., 2007), and with Costanzo and Woody’s (1985) suggestion that parents use more controlling feeding practices when they are concerned about their child’s weight. We found that while child BMiz was correlated negatively with concern about underweight, and positively with concern about overweight, it was not a significant independent predictor for maternal use of either pressure or restriction. This suggests that for our sample, mothers were not influenced by the child’s actual weight status when using these feeding practices. If parents were using these feeding practices in response to the child’s actual weight, we would have expected to see a significant relationship between BMiz and feeding practices at step 1 of the regression, possibly mediated by concern about weight at step 2. One explanation for this is that mothers are responding to their perception of the child’s weight status, which may not necessarily correspond to the child’s measured BMI. Alternatively, it is possible that mothers use these feeding practices in an attempt to control their child’s eating because they are concerned about the child’s future weight, rather than their current weight. While these feeding practices were not significantly predicted by maternal BMI in the present study, there may be other variables not examined here that could contribute to a mother’s perception of her child’s predisposition toward under- or overweight.

The relationship between child food fussiness and maternal use of pressure to eat was partially mediated by maternal concern about the child being or becoming underweight. This finding suggested that perhaps mothers use pressure because they are concerned that their children’s fussy eating will cause them to become underweight. However, most of the relationship between fussy eating and pressure could not be explained by the mother’s concern about the child’s weight. One explanation for this is that mothers use pressuring strategies directly in response to the child’s fussy eating behaviour because they see this eating behaviour as problematic for reasons other than its implications for the child’s weight. For instance, they may be concerned that the fussy child has an inadequate intake of nutrients, or that the child is not meeting health guidelines about the types of foods children should eat (e.g. the “5-a-day” campaign for fruits and vegetables). Another explanation is that mothers’ use of pressure to eat is the cause of fussy eating. Batsell and Brown (1998); Batsell, Brown, Ansfeld, & Paschall (2002) suggested that children who are forced to consume certain foods develop a “cognitive aversion” for those...
foods because they associate the food with the negative feeding experience. By that rationale, repeated use of pressuring techniques could contribute to children's fussy eating behaviour. This is supported by longitudinal research finding that girls whose mothers used higher levels of pressure to eat when they were 7 years old, showed more fussy eating behaviour at 9 years old (Galloway, Fiorito, Lee, & Birch, 2005). Additional longitudinal research in this area would be useful.

In the present study, the child’s food responsive eating style was the strongest independent predictor of maternal use of restriction, even after accounting for maternal concern about the child being or becoming overweight. As with pressure to eat, it is possible that mothers were reacting to the children’s eating behaviour for reasons other than their concern about child weight, for example concern about the child’s fat or sugar intake. Another explanation is that the child’s food responsive eating style was caused by the mother’s use of restrictive feeding practices. Experimental research suggests that overt restriction of a palatable food item can increase a child’s desire for the “forbidden” food (Fishier & Birch, 1999; Jansen et al., 2007). Persistent restriction may lead to children overindulging on these foods when they become available. That is, they learn to respond to food cues rather than internal cues of hunger and satiety. This notion is supported by a longitudinal study finding that daughters of overweight mothers who used high levels of restrictive feeding when they were 5 years old displayed more food responsive eating behaviour at 9 years than the girls whose mothers used low levels of restriction. However, this analysis did not control for the child’s initial eating behaviour, and it is possible that a higher level of food responsive eating at age 5 elicited greater use of restriction (Francis & Birch, 2005). Further prospective research in this area is required.

The present study benefited from using multivariate analyses. We added to the research in this field by examining the relative contributions of a range of maternal and child factors on the use of maternal feeding practices. However, there are limitations to our study that should be considered. First and foremost, the cross-section design means that we cannot draw causal conclusions from the results. The field of parental control over feeding suffers from a lack of prospective studies exploring long-term causal relationships between parental feeding, child eating and weight. Understanding these relationships is vital for developing effective public health interventions in the current obesogenic environment. Future research should explore whether feeding practices are associated with changes in child eating behaviour and weight over time, while also considering the potential impact of numerous biological and environmental influences. Long-term experimental studies may provide useful insight into the impact of parental feeding practices, although the implications of testing potentially destructive feeding strategies on children must be considered.

A second limitation to our study was that the measures were based on the mothers’ self-report rather than direct observation or objective physical measurements. Mothers may have been influenced by social desirability in their responses, particularly as child eating and weight are currently so prominent in media, and may be sensitive issues for some people. The measure of modelling of healthy eating was written for this study, and it should be noted that these questions have not been externally validated. Another limitation of our study may have been our sample, which was on average more highly educated than the Australian population. However, it is worth noting that the mean BMI score of our sample was comparable with a representative age- and gender-matched national sample (Australian Bureau of Statistics, 2009b). Our study did not distinguish between overweight and normal weight mothers, which may have influenced our results. Some studies suggest that the relationships between parental feeding practices and child eating behaviour or weight might differ according to whether the child’s mother is overweight or not (Faith, Berkowitz, Stallings, & Kerns, 2004; Francis & Birch, 2005; Powers et al., 2006). While we controlled for maternal BMI in our regression analyses, we did not examine how interactions between variables might change according to parental weight status. The sample of mothers of 2- to 4-year-old children in this study was useful for exploring the determinants of feeding practices in young children, but the results cannot be generalised to older children or to fathers. Our study also suffered from a lack of an adequate measure of ethnicity. Ninety percent of the sample was born in Australia, and we have no indication of what these women considered their ethnic background to be. There is some evidence that childhood obesity is higher in certain ethnic groups in Australia (O’Dea, 2008), and we were not able to explore these differences.

Our results provided support for Costanzo and Woody’s suggestion that parents are more likely to use controlling feeding practices when they are concerned about their child’s weight. The findings suggest that mothers use more pressure to eat when they are concerned about their child being or becoming overweight, and more restriction when they are concerned about their child being or becoming overweight. In contrast, monitoring and modelling of healthy eating appeared not to be determined by concern about child weight. Pressure to eat and restriction were associated with concern about child weight and with child eating behaviours, but not with the child’s BMI. This was an important finding because it suggested that parents might use these feeding practices to control a child’s weight pre-emptively, rather than attempting to modify the child’s current weight status. Future research exploring determinants of parents’ concern about their child’s weight is necessary for a better understanding of what drives parents to use controlling feeding strategies. Longitudinal studies are essential to establish the long-term impact of these feeding practices. It would be useful to explore potentially beneficial feeding practices in addition to those that are thought to contribute to problematic child eating behaviour.

References