



# Maternal child-feeding style during the weaning period: Association with infant weight and maternal eating style

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## ABSTRACT

A controlling maternal child-feeding style has been shown to have negative consequences for child weight and eating style for children over the age of 12 months. Maternal restriction is associated with increased consumption of food if given free access and child overweight. Pressure to eat conversely is associated with picky eating and a lower child weight. Little research however has considered the influence of maternal feeding style under 1 year, during the period when infants are being introduced to complementary foods. In the current study, 642 mothers with a child aged 6–12 months completed a copy of the Child Feeding Questionnaire (Birch, Fisher, Grimm-Thomas, Markey, Sawyer & Johnson 2001), the Dutch Eating Questionnaire (Van Strien, Frijters, Bergers, & Defares 1986) and reported infant and maternal weight. Differences in maternal feeding style were identifiable during this period and related to infant weight and maternal weight and eating style. Infant weight was positively correlated with maternal use of restriction, monitoring and concern for infant weight. Moreover, mothers high in restraint, external and emotional eating reported higher levels of concern for infant weight, restriction and monitoring and perceived their infants to be larger. The findings suggest that the extent to which controlling feeding practices are used is influenced by infant and maternal personal weight concerns even at this early stage. Potentially, these early behaviours could have long term consequences for child weight and eating style.

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## 1. Introduction

Current Department of Health recommendations in the UK advise the introduction of complementary foods from 6 months of age (DH, 2007) although many mothers introduce complementary foods before this period (Bolling, Grant, Hamlyn, & Thornton 2007). During the weaning stage infants receive their first tastes of solid foods, moving from a milk-based to a varied diet by the time they are around 12 months old. The weaning period is therefore potentially important in the establishment of both maternal child-feeding style and children's eating habits, yet there is a dearth of research examining this period of infant feeding.

Accumulating evidence from both US and UK populations demonstrates that maternal child-feeding style has a direct effect on child eating behaviour and food intake (for a review see Ventura & Birch 2008). A restrictive maternal child-feeding style has been linked with increased levels of eating in the absence of hunger (Birch, Fisher, & Davison 2003) and increased consumption of restricted foods when allowed free access to them (Lee, Mitchell, Smiciklas-Wright, & Birch 2001). The use of restriction is also associated with increased child weight, although the relationship is not always strong (Fisher & Birch

1999; Haycraft & Blissett 2008). Whilst restrictive feeding practices are likely to develop in response to child overweight (Francis, Hofer, & Birch 2001), maternal use of restriction can also increase child weight through over eating when the child is given free access to that food (Anzman & Birch, 2009). Conversely, maternal pressure to eat is associated with increased perceived pickiness or fussiness (Farrow, Galloway, & Fraser 2009) and a decreased intake of nutrient rich foods such as fruit and vegetables (Fisher, Mitchell, Smiciklas-Wright, & Birch 2002). Use of pressure to eat can stem from picky eating behaviours but evidence from experimental settings shows that pressure to eat a food is associated with decreased liking of the food (Galloway, Fiorito, Lee, & Birch 2006) and decreased consumption (Birch, McPhee, Shoba, Steinberg, & Krehbiel, 1987). Some evidence also suggests that maternal pressure to eat is associated with lower child weight (Brann & Skinner 2005). Mothers may react to their child's low weight but increased pressure to eat may discourage the child from consuming the target food (Faith & Kerns 2005).

The majority of the studies regarding maternal child-feeding style have been carried out with preschool aged children (Ventura & Birch 2008). However, as the relationship between maternal child-feeding style and child weight and eating style is bi directional, it is important to explore the role of early life experiences in the formation of maternal child-feeding style. Indeed, Farrow and Blissett (2008) found that pressure to eat measured when the infant was 1 year old was negatively correlated with birth weight, suggesting that even at

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this early stage mothers may react to infant size. Further evidence suggests that high levels of maternal control during this period may have a negative impact upon child weight. [Farrow and Blissett \(2006\)](#) observed mothers feeding their infants at 6 months old. Where maternal control was low, infants who had had slow weight gain during the first 6 months gained significantly more weight during the next 6 months and vice versa, thus balancing their weight gain. Conversely, when mothers showed high levels of controlling feeding practices, infants who had had slow weight gain continued to gain weight at a slower rate, and those with initial heavier weight gain further increased theirs. Thus level of maternal control during the weaning phase is potentially an important influence upon child weight.

The aim of the current study was therefore to examine differences in maternal control during the weaning period and explore differences in relation to infant and maternal characteristics.

## 2. Materials and methods

### 2.1. Participants

All participants gave informed consent prior to inclusion in the study. All aspects of this study have been performed in accordance with the ethical standards set out in the 1964 Declaration of Helsinki. Approval for this study was granted by the Department of Psychology Research Ethics Committee at Swansea University. Six hundred and forty-two mothers with a singleton child aged between 6 months and 12 months of age (mean age 8.35 months) whose child had started consuming complementary foods completed the questionnaire. Mothers were recruited to the study through posters placed in nurseries and community centres hosting mother and baby groups. In addition advertisements for the study were posted on internet parenting sites.<sup>1</sup>

Mothers provided information regarding birth weight and gestation. All infants included in the study had a birth weight  $\geq 2500$  g and were born at  $\geq 37$  weeks gestation. 68.7% of mothers were primiparous. The mean age of the respondents was 28.93 years and the mean number of years in education 14.23. Further demographic information is provided in [Table 1](#).

### 2.2. Measures

Data was collected using an online questionnaire designed and hosted using SurveyMonkey.com (Portland, Oregon, USA). The posters advertising the study provided a web link to the online questionnaire or contact details to request a paper copy of the questionnaire. For the online questionnaire, consent was collected using a series of checkboxes which had to be completed. The questionnaire examined maternal child-feeding style, infant and maternal weight and maternal eating style.

#### 2.2.1. Maternal feeding style

Participants completed a copy of the Child Feeding Questionnaire (CFQ) designed and validated by [Birch, Fisher, GrimmThomas, Markey, Sawyer and Johnson \(2001\)](#). The CFQ examines parental attitudes and behaviours towards children's diet and was designed to be used with parents whose children are consuming solid foods. This self report questionnaire aims to assess the level of primary career involvement and control over diet and key behaviours including perceived responsibility, concerns about child weight, restriction, pressure to eat and monitoring feeds alongside perceptions of both parental and child weight. Although the CFQ was designed with a suggested age

**Table 1**  
Sample distribution by demographic factors.

Indicator	Group	N	%
Age	$\leq 19$	22	3.3
	20–24	90	13.6
	25–29	278	42.1
	30–34	194	29.4
	$35 \geq$	76	11.5
Education	No formal	25	3.8
	School	88	13.3
	College	174	26.4
	Higher	373	56.5
Marital status	Married	457	69.2
	Cohabiting	170	25.8
	Single	26	4.0
Home	Owned	425	64.5
	Rented	183	28.3
	Council	33	4.5
	Other	14	2.7
Maternal occupation	Professional and managerial	267	40.5
	Skilled	116	17.6
	Unskilled	185	28.0
	Other	48	7.3
	Paternal occupation	Professional and managerial	213
	Skilled	218	33.0
	Unskilled	169	25.6
	Other	37	5.6

range of approximately 2 to 11 years, the majority of questions were applicable for those introducing complementary foods.

#### 2.2.2. Maternal eating style

Participants completed a full copy of the three scales of the Dutch Eating Behaviour Questionnaire which measures external, emotional and restrained eating behaviours ([Van Strien, Frijters, Bergers & Defares 1986](#)).

#### 2.2.3. Infant and maternal weight

Participants provided current weight and height from which Body Mass Index was computed. Respondents also gave details of infant birth weight and estimated current infant weight. If they were unsure participants were instructed to leave these sections blank. Six hundred and twenty-eight respondents (97.8%) provided an estimated current infant weight.

### 2.3. Data analysis

Data analyses were carried out using SPSS v13, SPSS UK Ltd. The CFQ was scored as per instructions to give the factors perceived responsibility, perceived parent weight, perceived child weight and concerns about child weight, restriction, pressure to eat and monitoring ([Birch et al., 2001](#)). The DEBQ was also scored following author instructions to give the scales restraint, external eating and emotional eating ([Van Strien et al., 1986](#)). Pearson's correlations were used to examine the association between weaning behaviours, maternal control as measured by the CFQ, maternal and infant weight and maternal eating style as measured by the DEBQ. Median splits were performed for the three scales of the DEBQ to compare differences in maternal beliefs and behaviours by maternal eating style using multivariate ANCOVA. Maternal age and education were controlled for throughout.

## 3. Results

Maternal feeding style during the weaning period was associated with both infant weight and maternal weight and eating style.

<sup>1</sup> [www.bounty.com](http://www.bounty.com); [www.mumsnet.com](http://www.mumsnet.com); [www.iwantmymum.com](http://www.iwantmymum.com) and [www.babyletweaning.com](http://www.babyletweaning.com).

### 3.1. Infant weight

Participants provided birth weight of the infant and gave estimates of current infant weight. In addition, as part of the CFQ, participants recalled their perceived size of the infant as they were growing during the first 6 months [much smaller than average, smaller than average, average, larger than average and much larger than average]. No significant associations were seen between infant weight at birth and maternal child-feeding style. However estimated current weight and perceived size were significantly associated with a number of measures. A heavier current infant weight was significantly associated with higher levels of restriction and lower levels of pressure to eat. Moreover, mothers who perceived their infants to be larger than average during the first 6 months postpartum reported significantly greater levels of concern for child weight, restriction and monitoring. Perceived size was also inversely associated with pressure to eat (Table 2).

### 3.2. Maternal weight, eating style and feeding style

A higher BMI was associated with increased maternal concern for child weight (Pearson's  $r=0.094$ ,  $p<0.05$ ) but no other maternal feeding behaviour. Moreover, maternal eating style was related to maternal feeding style. A multivariate ANCOVA showed that mothers high in restraint, emotional and eating reported significantly higher levels of concern for child weight, monitoring and restriction whilst also having higher levels of perceived maternal weight (Table 3).

Finally, mothers who reported higher levels of restraint (Pearson's  $r=0.068$ ,  $p<0.05$ ), emotional eating (Pearson's  $r=0.103$ ,  $p<0.01$ ) or perceived themselves to be a higher weight (Pearson's  $r=0.076$ ,  $p<0.05$ ) believed their infants to be significantly larger than average. However, none of these variables were related to actual infant weight at any stage.

## 4. Discussion

The findings highlight differences in maternal child-feeding style during the period infants are being introduced to complementary foods. Maternal control, weight and eating style during the second 6 months postpartum were associated with timing of introduction to complementary foods. Moreover, even at this early stage mothers appear to be reacting to perceived size of the infant. Although previous work has concentrated on the influence of maternal feeding and eating styles for children 12 months and older (Ventura & Birch 2008), the findings suggest that the antecedents of this control may be present sooner.

The current findings show evidence of maternal restriction and pressure to eat earlier than previously shown, during the weaning period. Mothers reported deliberately restricting the amount or type of food their infant ate or pressuring them to eat more food. Increased restriction was associated with a heavier infant or the perception that the child was larger than average whilst increased pressure to eat was associated with a smaller infant. It appears that even when infants are typically consuming only small amounts of food during the weaning

**Table 2**  
Association between maternal child-feeding style and infant weight.

	Birth weight	Perceived size	Estimate current weight
Perceived responsibility	0.010	-0.133**	-0.053
Perceived parent weight	0.043	0.076*	0.064
Concern child weight	0.005	0.107*	0.060
Restriction	0.045	0.100*	0.110*
Pressure to eat	-0.020	-0.146**	-0.080*
Monitoring	-0.007	-0.131**	-0.030

Pearson's  $r$ : \*\* $p<0.01$ , \* $p<0.05$ .

**Table 3**  
Differences in maternal feeding style for mothers high/low in restraint, emotional and external eating.

Eating style	Feeding style	Mean Score		$F$
		High	Low	
Restrict	Concern for child weight	2.87	2.68	$F(1, 544) = 5.32$ , $p<0.01$
	Monitoring	2.68	2.48	$F(1, 544) = 7.23$ , $p<0.01$
	Restriction	2.81	2.62	$F(1, 544) = 6.02$ , $p<0.01$
Emotional eating	Perceived maternal weight	3.34	2.98	$F(1, 544) = 20.89$ , $p<0.01$
	Concern for child weight	3.85	2.21	$F(1, 544) = 15.85$ , $p<0.01$
	Monitoring	2.56	2.22	$F(1, 544) = 7.13$ , $p<0.01$
External eating	Restriction	2.34	2.03	$F(1, 544) = 5.89$ , $p<0.01$
	Perceived maternal weight	3.23	1.89	$F(1, 544) = 32.50$ , $p<0.01$
	Concern for child weight	2.37	2.01	$F(1, 544) = 5.11$ , $p<0.01$
External eating	Monitoring	2.89	2.72	$F(1, 544) = 7.54$ , $p<0.01$
	Restriction	3.12	2.87	$F(1, 544) = 8.82$ , $p<0.01$
	Perceived maternal weight	3.22	2.88	$F(1, 544) = 21.57$ , $p<0.01$

stage, mothers are reacting to their perceptions of size and forming beliefs about whether they need to alter food intake. This is despite findings that during the first year postpartum, emphasis is placed on infant weight gain with a larger infant seen as positive (Haslam, Sattar, & Lean 2009).

In older children mothers may restrict intake of food because they believe their child is overweight (Francis et al., 2001). However, as discussed this may have the opposite effect as it can increase liking of that food and actual over eating if given the opportunity (Birch & Fisher 2000). During the period of 6 to 12 months old however it is likely that the infant has little control over accessing foods not permitted by the mother (Birch 1998). Whereas an older child may be able to covertly eat the controlled food when the mother is absent, a six month old child does not have the physical abilities to locate the food if not offered it. It is likely then that these initial attempts at restriction may appear to be successful. For example, maternal restriction amongst 2 years olds does reduce consumption (Grubbels et al. 2009) and is associated with a reduction in weight at 2 years old (Farrow & Blissett 2008). It is possible that use of restriction during this early period could be interpreted as successful and mothers may continue with this behaviour into the later years. It is likely however that this may lead to later over consumption when given free access to restricted foods (Fisher & Birch 1999).

Maternal eating style was associated with maternal child-feeding style. Mothers who themselves were high in restraint, emotional or external eating reported higher levels of monitoring, restriction and concern for child weight. Moreover, higher levels of restraint and emotional eating were associated with a perception that their infant was larger than average despite no actual association with reported infant weight or birth weight. Additionally, a higher maternal BMI was associated with increased maternal concern for child weight, again independently of actual infant weight. It appears that even at this early age, maternal eating concerns are associated with their perception of, or concerns for, their infant. Mothers may be transferring their body image concerns to their infant, becoming worried that their infant will follow the same pattern. Possibly mothers hold some understanding of genetic risk of obesity and are concerned that their infant is placed at increased risk of future weight problems. This reflects findings with older children that mothers who are overweight have higher weight concerns about their daughters (Johannsen, Johannsen, & Specker 2006), independently of their daughters' actual weight (Francis et al., 2001). However, the current research extends this evidence to infancy despite this period notably being a time where larger babies are often praised and seen as healthy (Haslam et al., 2009).

The study has a number of limitations. Although the sample was large and contained participants from a variety of socioeconomic backgrounds, the mean education level of the participants was higher than average (DIUS, 2007). Level of education was correlated with some measures of maternal feeding style and was therefore controlled for throughout the study. One reason for this could have been the use of the internet for recruitment purposes. Using the internet for participant recruitment is growing in the social sciences (Brown & Lee 2010; Fraley 2004) although criticisms of the method have been made. Internet recruitment is typically biased towards white, highly educated middle class samples and internet access is associated with a higher level of education (ONS, 2008). However, use of the internet is growing for seeking out health related advice (Larkin 2000), particularly amongst women (Sarkadi & Bremberg 2005). Many new mothers and pregnant women now use the internet to seek out advice and support (Russell 2006). Using this method did allow large numbers of participants to complete the questionnaire quickly and easily and the data provides a platform for further research. Observations of maternal–infant interactions during mealtimes would enable the topic to be further explored, although maternal and reported use of control does not always correlate (Haycraft & Blissett 2008).

Secondly, as the study was cross sectional, it was difficult to establish causality between feeding style and other variables. A longitudinal study tracking infants through the weaning period would help to establish how maternal eating behaviour and perceptions of infant weight may impact upon maternal level of control of feeding during this period.

In conclusion, the current study explores maternal feeding style during the second 6 months postpartum when infants are being introduced to complementary foods. It highlights occurrence and variation in maternal use of control during this period and examines influences of infant weight and size and maternal eating behaviours upon its use. Maternal concerns about her own weight and eating behaviour and perceptions about infant size may encourage the mother to use controlling feeding styles even at this early stage. Potentially this has long term negative consequences for child weight and eating style.

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No funding was received for this work.

#### Contributors

Authors A and B designed the study and wrote the protocol. Both authors have approved the final manuscript.

Author A conducted the literature search, undertook statistical analysis and wrote the first draft of the manuscript.

#### Conflict of interest

There are no conflicts of interest.

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