

Maternal Control of Child Feeding During the Weaning Period: Differences Between Mothers Following a Baby-led or Standard Weaning Approach

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Published online: 10 September 2010
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Abstract A controlling maternal feeding style has been shown to have a negative impact on child eating style and weight in children over the age of 12 months. The current study explores maternal feeding style during the period of 6–12 months when infants are introduced to complementary foods. Specifically it examines differences between mothers who choose to follow a traditional weaning approach using spoon feeding and purees to mothers following a baby-led approach where infants are allowed to self feed foods in their solid form. Seven hundred and two mothers with an infant aged 6–12 months provided information regarding weaning approach alongside completing the Child Feeding Questionnaire. Information regarding infant weight and perceived size was also collected. Mothers following a baby-led feeding style reported significantly lower levels of restriction, pressure to eat, monitoring and concern over child weight compared to mothers following a standard weaning response. No association was seen between weaning style and infant weight or perceived size. A baby-led weaning style was associated with a maternal feeding style which is low in control. This could potentially have a positive impact upon later child weight and eating style. However due to the cross sectional nature of the study it cannot be ascertained whether baby-led weaning encourages a feeding style which is low in control to develop or whether mothers who are low in control choose to follow a baby-led weaning style.

Keywords Baby-led weaning · Complementary feeding · Breast-feeding · Maternal control · Child feeding questionnaire

Introduction

A large body of research has examined the relationship between maternal child-feeding style and child eating style amongst children over the age of 12 months [1]. Maternal restriction of palatable foods has been associated with increased consumption of these foods when allowed free access and a greater BMI [2–4] whilst encouragement to eat is associated with fussiness, lower nutrient intake and underweight [5, 6]. Furthermore, these relationships appear to be bi-directional. Although mothers may respond to their child's eating patterns or weight by increasing control, increased levels of control have shown to amplify the behaviour under concern. Pressuring a child to eat increases picky eating and thus in some cases underweight whilst restricting access to palatable foods is associated with increased consumption of that food when given free access and in turn increased risk of overweight [5, 7].

There has been little examination of the role of maternal control in shaping eating patterns in infants under the age of 12 months. It is during this period that the infant receives its first tastes of solid foods and the potential opportunity to manipulate intake arises. Indeed, reasons given for introducing solid foods include to encourage the infant to sleep or become more settled [8, 9]. Furthermore, mothers express concerns about their infants' intake of solid foods and weight gain during this period which may potentially affect maternal feeding style in-line with studies of older children [10].

Two recent studies have shown that the first year is a critical time for the development of maternal feeding style

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and child eating behaviours. Farrow and Blissett [11] found that maternal pressure to eat at 1 year was negatively correlated with infant birth weight suggesting that mothers may be responding to infant size [11]. Secondly levels of maternal control measured at 6 months were associated with child weight at 1 year [12]. When maternal control was low at 6 months, infants who had had slow weight-gain during the first 6 months gained significantly more weight during the next 6 months, thus balancing their weight gain. Conversely, when mothers were higher in control infants with slow initial weight gain continued to gain weight at a slower rate, whilst those with early rapid weight-gain continued on a similar trajectory.

Current UK Department of Health guidance recommends the introduction of complementary foods from 6 months [13]. Traditionally, weaning food are offered to the infant on a spoon, with a gradual transition from purees and baby rice, to purees with a courser textures, finger foods and finally family foods by 12 months [13, 14]. Alternatively, baby-led weaning is a new approach to weaning that is emerging in the UK [15]. The baby-led approach to weaning involves presenting foods in their whole form and allowing the infant to self-feed by selecting and grasping food items rather than caregiver-led spoon feeding [16, 17]. Little empirical evidence in support of baby-led is available [18], however, as one of the key tenets of baby-led weaning is to encourage this self regulation with little parental intervention over intake of food it is likely that a baby-led approach is associated with a maternal feeding style that is low in control compared to traditional weaning. The aim of the current study was to compare the feeding style of mothers using baby-led versus traditional approaches to weaning during the period of 6–12 months postpartum. Our prediction was that mothers following a baby-led weaning style would report use of lower levels of control in comparison to those following a traditional weaning approach. In addition the influence of maternal and infant weight upon the weaning process was examined.

Materials and Methods

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. This study was approved by the Swansea University, Department of Psychology Research Ethics Committee. Mothers were recruited to a study exploring maternal experience of introducing complementary foods to their infant. Posters were placed in local

nurseries and community centres hosting mother and baby groups. Community groups were located in areas with varying degrees of social deprivation as measured by the Welsh Index of Multiple Deprivation [19]. Advertisements for the study were posted on Internet parenting sites and message groups (www.mumsnet.com; www.bounty.com; www.baby-led.com; www.babyledweaning.com). Responses were sought from mothers employing a variety of weaning practices by advertising in a wide range of locations, including those aimed at the baby-led weaning community.

Seven hundred and two mothers with a child aged between 6 and 12 months of age (mean age 8.34 months) whose child had started consuming complementary foods completed the questionnaire. Participants provided details about infant birth weight and gestational age at birth. Infants were excluded if they had a low birth weight (<2,500 g), premature birth (<37 weeks) or multiple birth. Six hundred and fifty-two mothers were included in the analysis. Participants provided demographic information (Table 1). 68.8% of mothers were primiparous. The mean age of the respondents at childbirth was 29.02 years, (range from 17 to 45) and the mean number of years in education was 14.24.

Table 1 Sample distribution by demographic factors

Indicator	Group	N	%
Age	≤19	17	2.8
	20–24	81	13.4
	25–29	256	42.4
	30–34	180	29.8
	35≥	70	11.6
Education	No formal	21	3.5
	School	77	12.7
	College	160	26.5
	Higher	346	57.3
Marital status	Married	420	69.5
	Cohabiting	158	26.2
	Single	23	3.8
Home	Owned	385	64.2
	Rented	172	28.5
	Council	21	3.5
	Other	22	3.7
Maternal occupation	Professional and managerial	252	43.2
	Skilled	106	18.6
	Unskilled	214	29.3
	Other	45	7.5
Paternal occupation	Professional and managerial	197	45.4
	Skilled	206	36.5
	Unskilled	152	26.9
	Other	9	1.5

Measures

Data was collected using an online questionnaire designed and hosted using www.SurveyMonkey.com [20]. 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 weaning style, maternal feeding style and infant and maternal weight.

Style of Weaning

There is no formal definition of baby-led weaning. The key messages of the approach focus on allowing the infant to self-feed and giving foods in their whole (rather than pureéd) forms. Spoon feeding and pureé use are not included in descriptions of the method but are not necessarily excluded completely [17]. To classify mothers as following a ‘baby-led’ or ‘standard’ weaning approach, participants were therefore asked to approximate the extent to which spoon-feeding was employed as a percentage of the time spent feeding their infant. Participants also estimated the extent to which pureéd foods were used during weaning as a proportion of all foods together. Response options were 100, 90, 75, 50, 25, 10 and 0% in both cases.

Mothers were classed as baby-led (BLW) if they reported using both spoon feeding and pureés 10% of the time or less. Alternatively if mothers reported using both spoon feeding and pureés more than 10% of the time they were classified as standard weaning (SW). This allowed mothers to be classified in the baby-led weaning category if they predominantly used the method but occasionally used spoon feeding or pureés (e.g. to feed a runny food). This classification has been used to group mothers in previous work [15].

A small proportion of mothers (7.36%) reported using one behaviour 10% of the time or less and one behaviour 10% of the time or more. These mothers were excluded from the analysis due to this mixed methods approach. The proportion of mothers in this category was however small suggesting that mothers fitted well into one of the two categories.

Maternal Feeding Style

Participants completed a copy of the Child Feeding Questionnaire (CFQ) [21]. The CFQ evaluates parental beliefs, attitudes and practices towards children’s diet and was designed to be used with parents whose children are consuming solid foods. It aims to assess the level of primary carer involvement and control over the child’s diet and targets behaviours and measures factors such as

restriction, pressure to eat, monitoring, perceived responsibility, concern for child weight, use of food for reward and perceived parental weight. The questionnaire has been used in many studies exploring maternal control of child eating style (for a review see [1]) and has strong internal consistency [21].

Although the CFQ was designed with a suggested age range of approximately 2–11 years, questions were applicable for those introducing complementary foods. All questions from the tool were used excluding those that targeted child weight over the age of 12 months, items targeting parental use of food as a reward for good behaviour and those inappropriate to child developmental age (e.g. ‘I intentionally keep some foods out of my child’s reach’). Overall questions from the subscales of CFQ scales of restriction, pressure to eat, monitoring, perceived responsibility, concern for child weight and perceived parental weight were used. Response options remained the same as for the original questionnaire. All respondents completed the questions and indicated no difficulty in doing so. A copy of the items used can be found in Table 2.

Infant and Maternal Weight

Participants provided current and prenatal weight and height from which Body Mass Index (BMI) was computed. Respondents also gave details of infant birth weight alongside providing estimates of infant weight at 6 months and the current time. Participants were asked to leave these sections blank if unknown rather than making uninformed estimates ($N = 25$). Finally, participants indicated their perception of their infants growth during the first 6 months post partum using a five point Likert scale [much smaller than average, smaller than average, average, larger than average and much larger than average].

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, concerns about child weight, restriction, pressure to eat and monitoring [21].

Maternal feeding style was compared for mothers using a baby-led or standard weaning approach. MANCOVA were used to examine differences in maternal control, maternal and infant weight between the two groups. As would be expected, age of infant was significantly inversely associated with frequency of spoon-feeding and pureéing of meals. Therefore age of infant was controlled throughout the data analysis.

Table 2 Adapted child feeding questionnaire

Perceived responsibility	When your child is at home, how often are you responsible for feeding her?
	How often are you responsible for deciding what your child's portion sizes are?
	How often are you responsible for deciding if your child has eaten the right kind of foods?
Concern for child weight	How concerned are you about your child eating too much when you are not around her?
	How concerned are you about your child maintaining a desirable weight?
	How concerned are you about your child becoming over weight?
Restriction	I have to be sure that my child does not eat too many sweet foods
	I have to be sure that my child does not eat too many high-fat foods
	I have to be sure that my child does not eat too much of her favourite foods
	If I did not guide or regulate my child's eating, she would eat too much of her favourite foods
Pressure to eat	My child should always eat all of the food on her plate
	I have to be especially careful to make sure my child eats enough
	If my child is not hungry I try to get her to eat anyway
	If I did not guide or regulate my child's eating, she would eat much less than she should
Monitoring	How much do you keep track of the sweet foods your child eats
	How much do you keep track of the snack foods your child eats
	How much do you keep track of the high-fat foods that your child eats?
Perceived parental weight	How would you describe your weight during your Childhood
	How would you describe your weight during your Adolescence
	How would you describe your weight at present

Results

Style of Weaning

Six hundred and fifty-two participants gave information regarding spoon and puree use. Forty-eight participants were excluded as they were classified as BLW for one approach and SW for another approach leaving $N = 604$. Of the remaining sample, 351 (58.1%) participants were classified as following a BLW feeding style, based on giving pureed foods and using spoon feeding 10% of the time or less. Two hundred and fifty-three (41.9%) followed a SW approach using purees and spoon feeding greater than 10% of the time.

Mothers following a BLW approach had significantly higher levels of education [$F(588) = 3.639, p < 0.00$], had a professional or managerial job [$\chi^2(1, 499) = 10.54, p < 0.001$] and were significantly less likely to have returned to work [$\chi^2(1, 564) = 4.55, p < 0.05$] in comparison to those using a SW approach. No difference was seen between the two groups for maternal age, marital status or income. Maternal education, occupation and return to work were therefore controlled for throughout further analyses.

Maternal Child-feeding Style and Style of Weaning

A multivariate ANCOVA was used to compare maternal child-feeding style as measured by the CFQ for mothers

following a BLW or SW feeding style (Table 3). Comparisons were made for the CFQ scales of restriction, pressure to eat, monitoring, perceived responsibility, concern for child weight and perceived parental weight. Mothers who followed a BLW feeding style reported significantly lower levels of restriction, pressure to eat and monitoring compared to mothers who followed a SW approach. Furthermore, independently of measures of infant birth or current weight, mothers following a BLW approach reported significantly lower levels of concern for child weight compared to mothers following a SW approach. No significant difference was seen between the two groups for maternal perceived responsibility or perceived parental weight.

Infant Weight and Style of Weaning

Participants provided birth weight of the infant and gave estimates of infant weight at 6 months and at the time of completing the questionnaire. Birth weights ranged from 2.75 to 5.25 kg (mean 3.58 kg), weight at 6 months from 5.8 to 10.6 kg (mean 7.45 kg) and current weight from 7.2 to 13.8 kg (mean 10.45 kg). In addition, 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, much larger than average].

Table 3 Differences in maternal feeding style for mothers following a BLW or SW approach

CFQ factor	BLW	SW	F
Perceived responsibility	4.53 (.032)	4.58 (.038)	$F(1, 580) = 1.34, p > 0.05$
Perceived parental weight	3.14 (.028)	3.20 (.034)	$F(1, 582) = 1.58, p > 0.05$
Concern over child weight	1.31 (.042)	1.64 (.051)	$F(1, 562) = 21.14, p < 0.001$
Restriction	3.00 (.032)	3.27 (.038)	$F(1, 583) = 33.60, p < 0.001$
Pressure to eat	1.39 (.043)	2.20 (.052)	$F(1, 584) = 156.72, p < 0.001$
Monitoring	2.55 (.080)	3.68 (.096)	$F(1, 584) = 87.26, p < 0.001$

Table shows means and standard errors for each factor of the CFQ

Overall a higher reported infant weight at 6 months was significantly associated with increased use of restriction (Pearson's $r = .110, p < 0.01$) and lower levels of pressure to eat (Pearson's $r = -.080, p < 0.05$). Furthermore, mothers who perceived their infants size to be significantly larger during the first 6 months postpartum reported significantly lower levels of pressure to eat (Pearson's $r = -.159, p < 0.001$), monitoring (Pearson's $r = -.131, p < 0.001$) and concern for child weight (Pearson's $r = -.070, p < 0.05$).

No significant differences were seen between those using a BLW or SW approach for infant birth weight, estimated weight at 6 months or estimated current weight. Mothers following BLW however perceived their infants to be significantly larger in the first 6 months postpartum [$F(1, 595) = 29.019, p < 0.001$] than mothers following a SW approach.

Discussion

The study explored maternal use of control during the weaning period examining differences between mothers who used a baby-led or standard weaning approach. Maternal control during this period was measureable using the CFQ with significant differences emerging between the two groups. Mothers who followed a baby-led weaning approach reported using significantly lower levels of restriction, pressure to eat and monitoring and held lower levels of concern for infant weight compared to mothers who followed a standard weaning approach. Notably this was despite no difference in birth weight, weight at 6 months or perceived infant size during the first 6 months postpartum between the two groups.

Although speculative, it has been suggested that following a baby-led weaning approach may promote infant self regulation of appetite although this is based on small scale and anecdotal findings [16]. The findings of this study indicate that mothers following this method report lower levels of maternal control, and hence allow the infant to self regulate intake compared to mothers following a

standard weaning approach. Based on studies examining the impact of maternal feeding style in older children, potentially infants who are following baby-led weaning are more likely to develop positive future eating behaviours and patterns of weight gain due to this lower level of maternal control [2–7]. Further research needs to establish whether level of maternal control during the weaning period has any long term outcomes and whether maternal approach to weaning (BLW or SW) has an impact upon later child weight and eating style.

Mothers who follow a baby-led weaning style report lower levels of maternal control over their infants during the weaning period. However, as the current study is cross sectional it cannot be ascertained whether following a BLW style encourages low levels of maternal control or whether mothers who want to follow a weaning style which is low in control choose to follow a BLW style. Alternatively, infant characteristics and eating style (for example slow weight gain or health problems) may impact upon choice of weaning method or ability to follow a BLW style. It cannot be stated with confidence that BLW per se has a positive effect upon future child eating style and weight, or whether maternal attitudes and concerns influence the choice of weaning method. A longitudinal study is needed to track development of maternal control during weaning. Do mothers who follow a BLW adopt a feeding style which is low in control as a consequence of baby-led weaning or are these mothers already low in control at the start of the weaning period? Conversely if mothers who are high in control adopt a BLW feeding style do they reduce their level of control through experience of following the method or do they find the method is incompatible with their desired level of control?

Following a BLW approach was associated with lower levels of concern for infant weight, despite no differences in actual or perceived size of the infants in the two groups. Potentially it is this low level of concern for child weight that allows the mother to follow a method where the infant self feeds and regulates their own intake of food. In turn this low level of concern is associated with a feeding style which is lower in control. It would be interesting to

examine the patterns of weaning followed by mothers who introduce complementary foods using a BLW but also hold concerns about their infants' weight. Do these mothers remain low in control and carry on with a BLW style or do they increase their level of control which is incompatible with a BLW style?

Research with children over the age of 12 months has shown the benefits of a maternal feeding style which is low in control for the development of child eating style and weight. However, although previous work has suggested that low levels of maternal control during the 6–12 month period may allow the infant to self regulate weight gain [12] research exploring the impact of maternal control during this period is sparse. Further research needs to examine whether findings from older children can be applied to infants during the weaning period. Are low levels of maternal control positive during this stage? Breast milk provides adequate levels of iron [22] and Zinc [23] for the first 6 months postpartum but complementary foods are then recommended [13]. Although anecdotal small scale evidence suggests infants do consume foods though self feeding at 6 months [24], mothers following a BLW approach report that their infant consumes lower proportions of food offered whilst consuming greater numbers of milk feeds [15]. Is it beneficial for maternal control to be low during this period, perhaps allowing a more gradual transition from a milk based to solid diet or do infants need to be encouraged to consume a certain amount of solid food during this period? More needs to be understood about the intake and eating styles of infants following a BLW approach before recommendations for the method can be made.

If low levels of maternal control during the weaning process are positive, the findings could be used to highlight the benefits of following a weaning style which is low in control regardless of weaning method. Mothers could be encouraged to apply the baby-led weaning principles of infant self regulation to mealtimes if they are using a traditional weaning approach. Based on this application it would also be noteworthy to examine the outcomes of infants of mothers low in control but following different approaches. Does following a baby-led weaning style have any benefit to later eating style and weight over following a standard weaning style when the mother is low in control? Is there any advantage to the infant being allowed to self select and self feed foods?

Critical evaluation of baby-led weaning is at an early stage. The methods used in this research allowed a large sample of data to be gathered in order to explore initial hypotheses surrounding the method. However two related issues arose. Firstly the sample had a higher than average level of education compared to the general population [25]. One reason for this may be that baby-led weaning is currently not publicised in mainstream sources [13]. Women

who follow the method will likely have researched the approach themselves, made a decision to follow it and looked for sources of information to inform their decision. These are behaviours typically associated with a higher level of education [26] leading to a higher level of education amongst women following the method. This reflects the demography of previous studies examining baby-led weaning [15]. Findings were however independent of maternal socio-economic status.

Secondly, online recruitment was used to locate the sample. This had the advantage that it allowed a target sample of mothers following baby-led weaning to be located and identified. The use of the internet for health related reasons is growing in popularity [27] with high numbers of pregnant and new mothers using the method to seek advice and support [28]. However, internet recruitment does lead to sample bias with white, middle class, older and more educated mothers more likely to use the internet [29]. This is reflected in the higher level of education in this sample. The findings offer an important initial insight into this approach to weaning but need to be recognised as applying to a sample higher in socioeconomic status. Further research needs to examine the use and occurrence of baby-led weaning in a population based sample.

In conclusion this study highlights that mothers following a baby-led weaning approach report exerting lower levels of control over their infants' intake compared to mothers using more traditional methods of spoon feeding and puree use. Following a baby-led weaning approach which is associated with low levels of maternal control may have positive consequences for future maternal child-feeding style, child weight and eating behaviour.

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